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THE WAY TO DEVELOP EXPERIMENTAL PEDAGOGY.

By Dr. C. SPEARMAN,
Reader in Experimental Psychology, University College, London.

THE present number of this journal issues under new direction and a new name. This re-baptism may be taken as an outward sign of spiritual re-birth.

In embarking upon such an important enterprise, we ought to be very careful that we choose the right route. Voices are still raised in various quarters to warn us that experimental pedagogy has not yet "found itself." And certainly, there are at least two rival conceptions as to its proper function. According to the one, it should rest above all things upon common sense; it should use, not pedantic jargon, but plain, good English; it should follow, not idle theory, but real experience; it should make tests not phantastically artificial, but thoroughly practical. But according to the other theory, it should be essentially founded on scientific psychology; ordinary language, it is urged, is "plain" to the layman, only because he is untrained in discriminating dangerous equivocalities; right theory is not the absence of experience, but the refinement of it; practicality is not gained but lost by striving for it prematurely. In this sense we may take the remarks of Dr. Myers at the recent meeting of the British Association, when he strongly advocated that scientific investigation presupposes scientific training, and that "mental tests" in lay hands would only lead to fallacious results and discredit of science.

To resolve this conflict of views is just now of considerable urgency. Energetic activity is developing all over the country, to make amends for past dilatoriness; committees are gathering in consultation; money is being raised, and plans organized. It will be serious enough, if later it should turn out that most of this is being diverted into useless and dangerous channels.

Fortunately, we possess, at any rate with regard to the common sense conception, plenty of good evidence as to how it actually pans out. It appears to have been put into practice at every age, and in almost all countries, whether in support of theoretical speculations, or in opposition to them. And at no age have such efforts been more frequent, and their results more easily estimated, than at present. Almost always, they have proved wonderfully freshening both for the teachers and the teaching; new interest has been stimulated; new energy aroused; and new appreciation created. Further, they often appear to have originated distinct improvements of method, either sloughing off obsolete formalities, or introducing useful novelties. On the other hand, while admitting

ATTENTION, "ENTWEDER WILLKÜRLICH ODER UNWILLKÜRLICH."

A FOOTNOTE.

By Professor J. W. ADAMSON.

THE following note has an entirely practical motive, the writer being of opinion that a mis-rendering (as he conceives it) of Herbart's meaning is at the bottom of a widespread misunderstanding of what the child's attitude should be towards instruction. The point touches every-day experience in the schoolroom, since the misunderstanding extends and works most mischief far beyond the bounds of professedly Herbartian circles.

The words quoted at the head of the note occur, as readers will remember, in the well-known passages in the *Umriss* which analyse attention. Felkin's translation ("Letters and Lectures on Education," pp. 136 ff.) and that of Lange ("Outlines of Educational Doctrine," pp. 62 ff.) both render the terms "voluntary" and "involuntary" respectively, and Prof. John Adams has given the stamp of his approval to the rendering ("The Herbartian Psychology," cp. x). Lange, however, qualifies his translation by the remark that in his opinion "forced" and "spontaneous" are more truly expressive than "voluntary" and "involuntary" in this connection.

The etymologist, no doubt, can make a good case for translating *willkürlich* by "voluntary." Even so, it is worth noting that so well-known an authority as Grieb's *Wörterbuch*, while giving "involuntary" as one of the equivalents of *unwillkürlich*, renders the positive form by "1, gratuitous; 2, arbitrary, capricious, absolute," the English word "voluntary" not being given. But, attaching whatever importance we will to the etymological argument, we are here dealing with technical terms, and on that ground etymology is not entitled to the first nor to the last word. To the writer of this note, Lange's second thoughts seem preferable as expressing more aptly the antithesis which Herbart is presenting. Attention, as he sees it, is "either forced or spontaneous. Forced attention depends upon resolution; the teacher often brings it about by admonitions or threats. Spontaneous attention is far more desirable and successful. It must be sought through the art of instruction; in it lies that interest at which we aim. Spontaneous attention is divided into that which is primitive and that which is apperceiving. The latter it is which is most of all important in instruction, but it rests upon the former, whose conditions continually call for consideration. . . . Primitive or original attention depends first of all upon the strength of the perception. Bright colours, loud speech, are more easily remarked than dull and noiseless tones" (*Umriss u.s.w.*, sections 73, 74, 75).

The question is not a matter of words only; such things seldom are. Evidence goes to show that there is much confused thinking abroad respecting the particular mode of attention which is most to be desired in the schoolroom. Herbart's meaning seems clear enough: "apperceiving, spontaneous attention" is the desirable mode, but the teacher is warned that primitive, spontaneous attention always has to be reckoned with, and that on occasion resort must be had to attention which is forced. But what Herbart called "*unwillkürlich*" (here translated "spontaneous") is customarily named "involuntary" in English books to-day; and accordingly there are those who hold (or profess to do so) that the teacher always prefers and indeed ought to secure "involuntary attention." At this point confusion arises from the fact that a manual very widely read for a quarter of a century by teachers and students of teaching restricts (or did so in its earlier editions) the term "non-voluntary" to that primitive, spontaneous attention dependent upon strong sense-stimulus, out of which in due course apperceiving, spontaneous attention develops.

Heedless readers easily bridge the chasm separating "non-voluntary" and "involuntary." Between Herbart not accurately rendered and Sully misread, they arrive at a position something like the following. Involuntary attention is attention rendered without effort to any object which forcibly presents itself to one or more of the senses. It is also that mode of attention which the teacher should desire to secure. Therefore the teacher must persistently *shock* the child into attending. On the other hand, these same persons forget the meaning attached by such writers as Dr. Sully to the term "voluntary." First using it in Herbart's sense of "forced" or "compelled," they next, in defiance of Herbart and his English exponents, go on to taboo this mode of attention in the classroom. In the phrase of an unfashionable metaphysic, they think that the will of the pupil should not be evoked.

Necessarily this conclusion vitiates their ideas about interest. In this frame of mind, they only darken counsel when engaged, for instance, upon such a discussion as that of Interest *v.* Effort. They tend to regard these pedagogical motives as entirely incompatible. No sort of interest is accompanied by effort, and every species of effort destroys interest. Children when in school must be amused, not induced to work; change and novelty are demanded by them on pain of ignoring the schoolmaster's efforts—for that unfortunate serves a "doctrine of effort" which is unlike his pupil's. One pundit of this way of thinking classes interest amongst the *external* conditions of attention.

It would not be in place here to enlarge upon the moral significance of opinions which chime so melodiously with the general slackness of the times. But one may at least protest that the flabby thinking which gives rise to those opinions, and to measures designed to apply them in practice, are perversions and travesties of the sound doctrine of interest, a doctrine which they turn into mischievous nonsense. Any mode of attention which is accurately described as non-voluntary or involuntary is too disconnected, casual and evanescent to be of advantage to the teacher. The cardinal fact for him is that he must secure his pupil's active co-operation, not hold him spell-bound by balancing a pole on his nose. The teacher desires most of all to induce a spontaneous, apperceiving attention; failing that, he falls back for a time on forced attention, attention given with conscious effort, attention against the grain.

But, forced or spontaneous, the only attention of stable worth to the teacher is a voluntary one, an attention which springs from an internal motive and not from some impressive attack on the organs of sense. It is therefore submitted that, to avoid making the weaker brethren offend, it would be well to give up translating "die willkürliche Aufmerksamkeit" by "voluntary attention."

MODERN EDUCATIONAL PSYCHOLOGY.

By WILLIAM BROWN, M.A. (Oxon.), D.Sc. (Lond.),
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In the Report of the Committee on "Mental and Physical Factors involved in Education," presented at the meeting of the British Association at Sheffield last year, an excellent account is given of the status of psychology in modern educational theory and practice, and in an Appendix a large number of typical problems for future psychological research are enumerated. The intention of the following paper is merely to emphasize the importance of some of the points there touched upon, to give a more detailed discussion of them in the light of personal experience and personal opinion, and finally to supplement them by additional suggestions of a quite general nature.

It is important to realize at the outset that the educational psychology of the present day is no new science, but merely a stage, though possibly a very important stage, in the course of development of a branch of study which extends at least as far back in history as the time of Plato. The experimental mode of procedure which it advocates is no more than a refinement and development of the general method of observation and introspective analysis used from earliest times. It has no jurisdiction over the ends or ideals of education—these are fixed by philosophy, in the widest sense of the word,—but only over the means to such ends, so far as they are dependent upon the mental constitution and laws of mental development of the child.

Even within this, its true and proper domain, it unduly limits its own scope if it lays any great stress on experiment as distinguished from the more general methods of observation characteristic of an earlier age. However ingenious an experiment may be, its relevance rests upon pre-formed general psychological conceptions, and its results are intelligible only in the light of general psychological theory. As employed in educational psychology its purpose should be evolution, not revolution. Experimental pedagogy cannot afford to spurn traditional lore nor the intuitions of educationists of an older school. Analysis, interpretation, and a wide and generous view of the whole ground, are essential to any employment of the experimental method which is to be really fruitful.

All this is, of course, clearly realized by the great leaders in the science, but the neglect of such precaution by inadequately-trained investigators is possible, and likely to lead to unsatisfactory results. In an extreme case it might happen that the conclusions were nothing but the presuppositions of the experimenter rendered explicit.

Coming to closer quarters with our subject, but still discussing it from the most general points of view and in the most general terms, we find that a very large number of the investigations may be grouped together as studies of individual mental differences or individual mental endowment. One method of colligating the data has been to draw up lists of *mental types*—e.g., types of perception, types of mental imagery, types of attention, types of reading, emotional types, &c. Other methods, not so thoroughly carried out hitherto, as the preceding, are (1) the determination of the degrees of *variability* of different mental functions, both as regards the various performances of the same individual and also as regards whole classes of individuals, and (2) the determination of the degree of *concomitance of variation* in different mental functions within the same group of individuals, and as an inference from this the closeness of relation, or the extent of mutual implication of, various mental functions and capacities with one another.

The first of these two methods has hitherto been employed but seldom and to little purpose, yet it is concerned with the basal principle of the whole class of problems here under consideration. The importance of the method for applied psychology is, perhaps, less than it is for pure psychology; but it is by no means nil, and in connection with the other of the two methods, commonly known as the method of *correlation*, it is undeniable.

The value of correlation in experimental pedagogy can hardly be over-estimated. Indeed, it is likely to prove the most powerful instrument of analysis yet discovered for psychology. Its use, however, is beset by many dangers which have not always been avoided in the past. Without going into details, we may say that these dangers are for the most part reducible to two great sources of error, viz., (i) the employment of too small a "random sample" or number of cases; (ii) heterogeneity of material. To steer clear of both is a task of exceptional difficulty, since avoidance of the one almost inevitably entails shipwreck on the other;

τούτου μὲν καπνοῦ καὶ κύματος ἐκτὸς ἔεργε νῆα.

Another general class of error consists in what have been called "errors of observation"; but it seems more logical to treat these as, for the most part, cases of variability within the individual and to consider them under the previous heading. They should form the subject of preliminary investigations, and where it is proposed to use formulæ for their correction, the exact *presuppositions* of such formulæ should not only be clearly recognized, but should also be submitted to the test of direct experiment.

As regards the mental tests used, it is important to make sure that they really do measure what they are intended to measure. In many cases it is difficult to say exactly what mental function or group of mental functions are being brought into play by the tests. Here correlation results are very helpful, but they require to be interpreted with great caution.

Special apparatus is undoubtedly of great help in the development of our science, and its employment in carrying out preliminary control experiments with trained subjects in the psychological laboratory is an almost indispensable stage in any piece of educational research. In experiments on children, however, it should be replaced as far as possible by the simpler apparatus of pen and paper, in order to keep the conditions as closely similar as may be to those of the school routine. There seems to be no serious reason why the ordinary material of school study should not be employed to a much greater extent than is actually the case, as psychological material from which to deduce important psycho-pedagogical laws. Parallel analyses of school subjects, into their logical and psychological elements respectively, would form an invaluable basis for a detailed investigation of "scholastic" intelligence, and a standardization of the marking-system might be expected to contribute to it that quantitative definiteness which is the indispensable coping-stone of all true science. The marking, however, should be much more detailed than has hitherto been the case, and the marks for the recognizable elementary part-capacities should be kept separate from one another, and then correlated. This would give an insight into the nature and extent of their interrelations of the utmost value. Here lies the chance for the psychologically-trained secondary schoolmaster.

Is it necessary to add that the emotional side of the child's consciousness must not be neglected? Even here the experimental method is not entirely without resource. It is indeed true that, apart from such simple experiments as those for the testing and measurement of elementary forms of suggestibility, the work of the "pendulum and chronograph philosophers" has not hitherto met with any very startling success. Yet a school class gives many opportunities of observation of character "under test conditions," and a sound training in general psychology is all that is necessary to qualify the sympathetic and successful teacher for making full use of these opportunities. The modern doctrine of the *sentiments* is likely to prove very helpful in the development of this side of the science.

Experimental pedagogy has shown a vigorous and steady development during the last few years, and encourages the hope of an exceptionally brilliant and successful future. The air is thick with original ideas and new methods of investigation of acknowledged psychological worth. If the results obtained do not in every case inspire the same amount of confidence, the reason is not far to seek. The experience and insight of the educationist should be combined with the technique of the psychologist, preferably in the same individual, to produce a thoroughly sound system. Prominent instances occur to one which prove that this is already the case. That they may become more frequent must be the sincere wish of everyone interested in the future of education.

SOCIAL CLASS AND MENTAL PROFICIENCY IN ELEMENTARY SCHOOL CHILDREN.

By W. H. WINCH.

I.—The Problem Stated.

Some ten years ago, there was much discussion in the committees of the Local Authority for Education in London on the problem of the backward child, and since that time there has been a more or less continuous educational interest in the question. One of the recent annual reports of the Board of Education of New York, for example, gave much space to it. It is not the problem of the mentally defective child to which I am now referring. The great cities of Germany, England, America, and, quite recently, Paris, have, in different ways, dealt with that problem already; in England, certainly, in a most expensive way. But the questions are not entirely disparate. For there is little doubt that if the problem of the backward child were adequately dealt with in the ordinary schools, many poorly endowed, though not defective children, who are now segregated into special schools, would find an appropriate educational *milieu* without entering the special school at all. And that, in itself, would be so much to the good. But the present question is a much bigger one; and the results of a proper understanding of it will affect much more than a fringe of the problem of the treatment of the mentally defective. It is so big a question that this research of mine can claim to deal only with one aspect of it.

In the discussions above cited, the backward child was defined as one who was two years behind normal progress for his age. And normal progress was estimated by the "standard" or class reached in school. It is quite true that the "standards" in different schools did not mean precisely the same things. They were not scientific standards; they never were, even in the days when His Majesty's Inspectors annually examined each child in his class or standard, and by his examination determined whether he should go forward into a higher class or not. But with "freedom of classification" by the teacher, the problem of the backward child became more apparent. A large number of children were to be found below the ideal standard for their ages, and educationists who were also administrators began to have many searchings of heart. Statistics of progress were examined in a large variety of schools; whole districts were considered as units, and schools were considered individually. It seemed clear that delay in school advance was fairly common; but it did not seem clear what, precisely, the contributory factors were. The argument was advanced that the town population was degenerating intellectually as well as physically. But the change seemed to be too sudden for a degenerative process, though I should be far from asserting that no degenerative processes are going on in densely packed populations. There is, however, absolutely no single body of fact in existence, which is reliable scientifically, on the comparative intellectual powers of town and country children. Some day, if I can obtain an adequate field of observation, I hope to make such a comparison; meanwhile, I can but guess and infer. Other arguments were advanced to account for the great variety that soon became apparent in different schools when the annual standardization of His Majesty's Inspector was given up. It was urged that the retardation was to be found especially in poor neighbourhoods, where the children were thought to be more poorly endowed mentally, and where their social circumstances gave them an inferior educational environment at home. But the figures of progress within the standards did not appear to bear out this contention. Many of the schools in very poor neighbourhoods showed a high rate of progress, whilst, on the other hand, some well situated schools showed much retardation. Moreover, it was urged by some that mental endowment was quite equally distributed among all social classes, and therefore the conclusion was *a priori* unlikely; and those who held a different opinion were told to look at the men of genius who had risen from the humblest positions. It was all very inconclusive, as, indeed, most educational argument is likely to be, until we have a body of valid knowledge, biologically and psychologically acquired, collected with especial reference to the real problems of education, and about human beings existing under the actual conditions of school and life. "What is the use," said some, "of discussing the question of retardation at all unless you are sure that the teachers are equally good in different kinds of schools? Do not the best teachers seek out and find the schools in the better neighbourhoods?" He would be a rash person who answered that question wholly in the negative. Others said, "We think that the children in 'poor' schools are as capable as the children in the better neighbourhoods; at any rate, if they are not, they should have an equal chance with other children by being set to study the same curriculum." It is a combination of these doctrines which has given us, in all the great educational countries of the world, a set of curricula and standards based on the principle that all public elementary schools contained children who were so much alike mentally, that the same curriculum and the same rate of progress might be expected from all. The German Lehrpläne and the American Courses of Study are evidences of this. The English Board of Education no longer takes this view; but if varying curricula are to be adopted, the principles which are to govern their adoption are not evident. But is it just that curricula should vary according to the social character of the neighbourhood in which a school may be situated? Let us all agree that no clever boy or girl must be kept back in any school by the adoption of a curriculum of a simpler and less advanced type than that of other schools. Is it just even then? Are there, on the average, such mental differences between pupils in different neighbourhoods as would justify it? If there are, how are we going to find it out?

We cannot compare one school with another unless we are sure of an approximate equality between the teachers of the two schools. We might, of course, take a number of schools of the best class, and of the second class, and so on, in which the teachers might happen to be approximately equal, and by actual examination test the point at issue.

But that is a long and cumbersome method, and we can avoid it; *for there are schools so situated that they contain within themselves the children of one or more social classes.* There are not many such schools where the existence side by side of two types of pupil leap to the eye, but there are some. In my inspectorial work I noted one or two such cases, and, as soon as opportunity arose, began to see if I could get any valid data on the connection between mental proficiency and social position, as far as school children were concerned. I intended to compare the results in one or two schools where the children were heterogeneous with one, at least, in which they were much more homogeneous. But it may not occur to those who are primarily educationists that I gain much by limiting my comparisons to pupils who are merely in the same school.

Well, I am going further. I am going to show comparisons between pupils of the same standards or classes, under the same teachers, under the same time-table of work, and the same school curriculum. Some of these children will come from good houses, some will come from inferior ones. I am going to compare the mental work of the two classes of children.

At this point I wish to express a preference for a method which is not adopted in this inquiry. A psychological examination in the more important mental functions would have been more conclusive as to natural endowment than the results of school terminal examinations. But the general direction of the results would have been the same. For I had managed to obtain schools in which the Head Masters examined with great care and thoroughness, and did not merely adapt their school examinations so as exactly to cover the work in which all the members of their classes had, by dint perhaps of much teaching, become proficient. If there are differences between the mental proficiency of boys of different social classes, they will be much more apparent where the "pitch" of the examinations is high (but not too high) than where it is low. The tests set should be, on the whole, somewhat above the level of the average child if any very clear difference is to emerge statistically. A set of tests too hard means that all except the very ablest children are "slumped together," so to speak, at the bottom; a test too easy means that all except the very inferior children are "pushed together" at the top. Then the question of age must be considered. For a boy of ten years with low marks in Standard IV has really done much better scholastically than a boy of ten with high marks in Standard II. So that in comparing the attainments of boys of the same class or standard who come from homes of different kinds the ages of each group must also be taken into consideration.

II.—First Investigation—School "L.A."

The first observations were made in a long-established municipal boys' school situated in an inner suburban district in London. The school fronted upon a "good" district, and backed upon a "poor" one residentially. The boys from the front and those from the back could, indeed, be distinguished from each other, at least by the expert visitor, in both class and playground, without the adoption of any refined system of measurement. The measurement, in fact, would be very likely to give a diminution of the *apparent* differences; since the inferior clothing of the poorer boys inevitably tends to bias our judgment against them as human beings.

First of all, the boys of the school were all scheduled and divided into two classes according to their social position as measured by the kind of house and house room which they occupied. The houses from which the boys came varied in rental from £45 per annum, exclusive of rates, down to ten shillings a week, without the addition of rates. These were divided into two classes, A and B, as follows:—

Class A contains those roads and streets in which, as a rule, each family occupied a whole house, and those in which the houses were large enough to contain two families without undue crowding and with a due regard to privacy. The rental paid for houses in this class ranged from £45 per annum exclusive of rates to £26 per annum exclusive of rates.

Class B contains streets of small houses which were for the most part inhabited by two families. These houses ranged from fifteen shillings to ten shillings a week in inclusive rental.

A few streets were of a mixed character; and the personal knowledge of the Head Master and the School Attendance Visitors was required to decide in each particular case whether the boy's home should be placed in Class A or Class B.

Finally, the whole classification was submitted to the Head Mistress of the Girls' School and to the School Attendance Visitors.

No objection was raised to any of the classifications under Class B; but one of the Visitors would have ranked as "mixed" a few of those placed in Class A. Forty-seven streets and roads were placed in Class A, twenty-six were placed in Class B, and four were scheduled as "mixed."

The estimate of the children's mental proficiency was derived from the results of the Head Master's final examination for the year, held in June and July, 1906. It was given and marked without any knowledge of, or reference to, this inquiry, which took place in the autumn of the same year. The statistical results are collected from the marks for this examination which, in accordance with the regulations of the Local Education Authority, are inserted and kept in the Head Master's Official Record Book. School subjects other than those tabulated were taught and examined; but it was decided, with a view to lightening the statistical work involved, to schedule only the results for Reading, English Composition, Spelling, Arithmetic, Drawing, and Manual Training. The average mark for all subjects includes other marks than those for these subjects. No results are scheduled for any examination test in which a careful individual mark (as opposed to a class mark) had not been given to each pupil's work. No other results are of scientific service.

I propose to give first a summarized classification of results in which the actual figures obtained at the examination are totalled and averaged, subject by subject.

TABLE I, showing the work of the Class A and Class B children compared, subject by subject, and standard by standard.

Standard.	Social Class.	No. of Children.	Av. Age on 31/7/06.	Av. Mark per subject at Midsummer Exam. 1906.	AVERAGE MARK FOR					
					Reading.	English Composition	Spelling	Arithmetic.	Drawing.	Manual Training.
			Yrs. Mths.							
I	A	8	8 11	7·0	6·9		6·4	6·5	5·2	
	B	11	9 6	6·4	6·6		5·0	5·5	5·5	
II	A	27	9 3	5·9	7·8		3·6	4·9	6·0	
	B	17	9 5	5·2	7·6		3·1	3·5	5·7	
Mixed. II & III	A	20	9 4	7·0	8·0		5·4	6·8	7·0	
	B	19	9 10	6·2	7·4		4·1	6·1	6·3	
III	A	23	10 0	7·2	9·3		5·6	6·0	7·6	
	B	26	11 0	6·4	8·1		4·9	5·1	6·4	
IV	A	43	11 2	7·2	8·3		7·4	6·9	6·2	
	B	20	11 3	6·9	7·3		7·4	5·3	6·9	
V	A	29	12 2	6·3	8·9	7·7	7·9	6·3	7·6	7·5
	B	15	11 8	5·8	7·9	7·5	6·9	5·8	6·2	7·4
VI	A	19	13 5	5·2	7·3	6·4		2·8	5·9	8·4
	B	10	13 7	5·4	8·3	5·5		3·6	5·0	8·3
VII	A	11	14 2	6·9	8·5	7·2		7·2	6·0	8·6
	B	6	13 6	6·2	8·0	6·3		4·2	7·6	9·0

Notes on Table I.

1. The maximum mark is in every case 10.

2. From the boys who, in the ordinary course, would have formed Standards V to VII, there were removed in the years 1903-4-5, under official regulations, to a neighbouring Higher Grade School: St. V, 6 boys—5 of Class A and 1 of Class B; St. VI, 10 boys—9 of Class A and 1 of Class B; St. VII, 6 boys—5 of Class A and 1 of Class B. The results given in the Table are, therefore, unduly favourable to Class B in these three standards in comparison with those of Class A.

3. The column headed "Average mark per subject" includes all those for which an individual mark was given, and not merely those for Reading, English, Composition, Spelling, Arithmetic, Drawing, and Manual Training.

4. The "mean variation" and the "probable error" for the averages in Reading, Composition, Spelling, Arithmetic, Drawing, and Manual Training have been calculated in each case. With a few exceptions the averages are more than two or three times the "probable error." The exceptions are those for Spelling and Arithmetic in Standard II, for Spelling in the mixed class of Standards II and III, and those for Arithmetic and Drawing in Standard VI. In these cases the variation is high; but is approximately equally high for the children of both Class A and Class B, though slightly higher for the children of Class B.

Table II.—All standards.

Class.	No. of Children.	Av. Mark per Subject.	AVERAGE MARK FOR					
			Reading.	Composition.	Spelling.	Arithmetic	Drawing.	Manual Training.
A	180	6·6	8·3	7·2	6·2	5·9	6·6	8·0
B	124	6·1	7·6	6·6	5·2	5·0	6·2	8·0
Percentage of B's Marks on A's		91·4	91·5	91·7	84·0	84·8	93·9	100·0

It is unfortunate that some of the marks are obviously the result of a test too difficult, as, for example, those of Standard II in Spelling and Arithmetic, and that of Standard V in Arithmetic. Others again are the result of a test of too easy a nature. This appears to be the case with several, if not all, of the Reading tests and with two out of the three tests in Manual Training. As long as we compare the children in Class A and Class B, subject by subject, no very serious error arises; though *any test* which places the average mark very near either the maximum or minimum mark is not quite satisfactory for statistical purposes. Especially does error arise when marks for these subjects are added to the marks for others; for it is obvious that the resulting totals and averages with the comparisons drawn from them are much more determined by the big numbers than the little ones. And some error also arises when the high marks of one standard are added to the low marks of another in the same subject, provided that the inequalities are due to the nature of the test. The first kind of statistical error is involved in the average mark for all subjects in Tables I and II, and the second kind is involved in the averages and percentages in Table II.

The Head Master did not for a moment allow the contention that Standard II, for example, was really an inferior standard, as the marks for Spelling and Arithmetic apparently showed. So we endeavoured to eliminate this source of error as far as we could. It was decided to assign 100 marks to each subject in each standard, and to divide this number between the average Class A boy and the average Class B, proportionately to the actual averages for the two classes in each subject in each standard. With this preliminary explanation, the two tables immediately following will, it is hoped, be intelligible.

TABLE III, showing, for each subject and standard, the proportionate distribution of marks between average boys of Class A and Class B.

Standard.	Social Class.	No. of Children.	Reading.	English Composition.	Spelling.	Arithmetic	Drawing.	Manual Training.
I	A B	8 11	51·1 48·9		56·1 43·9	54·2 45·8	48·6 51·4	
II	A B	27 17	50·6 49·4		53·7 46·3	58·3 41·7	51·3 48·7	
II & III	A B	20 19	51·9 48·1		56·8 43·2	52·7 47·3	52·6 47·4	
III	A B	23 26	53·4 46·6		53·3 46·7	54·1 45·9	54·3 45·7	
IV	A B	43 20	53·2 46·8		50·0 50·0	56·6 43·4	47·3 52·7	
V	A B	29 15	53·0 47·0	50·6 49·4	53·4 46·6	52·1 47·9	55·1 44·9	50·3 49·7
VI	A B	19 10	46·8 53·2	53·8 46·2		43·8 56·2	54·1 45·9	50·3 49·7
VII	A B	11 6	51·5 48·5	53·3 46·7		63·1 36·9	44·1 55·9	48·9 51·1

TABLE IV, showing, for all standards, the proportionate distribution of marks between average boys of Class A and Class B.

Class	Reading.	Composition.	Spelling.	Arithmetic.	Drawing.	Manual Training.
A B	51·7 48·1	52·1 47·8	53·0 46·3	54·2 45·7	51·2 48·4	50 49·9
Percentage of B's Marks on A's......	93·3	91·7	87·3	84·3	94·5	99·8

III.—Summarized Conclusions from the Results in School "L.A."

1. In every class but two the boys belonging to Class B are older for their standard than the boys belonging to Class A. The "B" boys evidently made less rapid progress through the standards. A "rough and ready" estimate of their relative proficiency is afforded by the percentage of A's and B's to be found below Standard IV; 59 per cent. of the boys in Class B are below Standard IV and 43 per cent. of the boys in Class A.

2. The general educational attainments of the boys in Class B are, in every standard but one—Standard VI—below those of Class A. Of the boys who would, in the ordinary course, have formed this standard, ten of the younger and abler boys (nine of whom were in Class A as compared with one in Class B) had been transferred under official regulations to a neighbouring Higher Grade School. The superiority of the "B" boys in the case of this standard is most likely therefore the result of selection.

3. The greatest inequality between the two classes, A and B, appears to be in Arithmetic, Spelling and Composition. The Head Master explains this by stating that, in his opinion, arithmetic and spelling, of all school subjects, "make the strongest demand on the attention and possess least inherent interest." From whatever cause, these are said to be the most difficult elementary school subjects; and if the intellectual proficiency of the pupils in Class A is greater than that of the pupils in Class B we should expect to find the differences greater in these two subjects. In English Composition (measured only in Standards V, VI, and VII), Class B is considerably below Class A, but this might easily be due to the more favourable home environment of the pupils in Class A, and might not indicate native superiority.

4. The smallest inequalities between the two classes appear to be in Manual Training (Woodwork) and Drawing. In the Manual Work the natural endowment of the two classes appears to be approximately equal. If we believe that education should deal (within limits, of course), with proficiencies rather than with deficiencies, a more manual curriculum is obviously indicated for the boys of Class B as compared with those of Class A.

The Head Master, who kindly furnished me with a memorandum of his own on the results, writes:—

> The conclusion appears inevitable that the progress and attainments of children in school are largely influenced by the home and its environment. The boys from homes where privacy is found and decent surroundings prevail do better than the boys from the more crowded houses where privacy is impossible and where the surroundings are more sordid. *There is no question here as to helpless poverty or insufficient feeding.* Only five children out of a total of three hundred and four, *i.e.*, under two per cent., come from families in receipt of parish relief; they come from three houses, and in each case the mother is a widow. The boys of the school are, with few and only

occasional exceptions, well fed; the only marked difference between them is the character of the home and its surroundings.

The contrast between the two sets of results is heightened when it is remembered that the lower half of a standard determines the level of teaching for the whole, and that the bulk of the teacher's labour and attention is given to the boys of the lower half.

Examination Results do not give an exact measure of attainments. But they indicate clearly whether attainments are greater or less, with indications of the magnitude of the differences.

The lower attainments of the B Class would be explained by assuming that attainments are the measure of ability; in other words, that the B Class is inferior in ability to the A Class.

But a school examination cannot afford a test of all a boy's abilities, and to assume that the marks imply relative ability is, in this case, to assume that the children's ability is proportional to the father's income. The hypothesis is a rash one.

The lower attainments of the B Class are due, not to difference of potential ability, but to the different degree in which the home influence develops and directs, or misdirects, the abilities of children.

All the available abilities a man possesses are the result of training of what is at first but potential ability. The training includes all the influences of the home, the school, society and personal experience. In the school work the B Class is from the first handicapped by the faults of the home and surroundings. The following are among the chief points in which the pupils of Class B are at a disadvantage:—

i. Their homes afford little intellectual stimulus, a very narrow range of interest, and little intelligent conversation.

ii. Their homes afford no materials or convenience for reading or lessons, and no encouragement to intelligent or skilful activities.

iii. The example of the parents often, of the neighbours always, and the play in the streets, do not aid the growth of the power of mental and moral self-control.

This is an able memorandum. It is obvious that, either by nature or nurture, or both, the boys of Class B are inferior. The Head Master puts the differences down to more or less satisfactory home conditions, and makes a strong case for his view. But I think there are indications afforded by the results to show that the differences are rather natural than nurtural. The memorandum states that boys of Class B do not read so much or hear so much intelligent talk at home as the boys of Class A. True; but the differences are relatively small in Reading and English Composition, which are the subjects that these factors would most directly influence. No one pretends that the children of either class are taught Arithmetic and Spelling by their parents, yet it is in these subjects that the differences are greatest. Nor do the children do Woodwork at home, where the difference disappears. The fundamental difference appears to be natural rather than the effect of nurture. In respect of school training the Head Master asserts that Class B is more favourably situated than Class A, for the teacher directs his teaching and syllabus to the weaker children of his class. There is therefore strong presumption that the boys of Class B are inferior in that potential ability which is one condition of the educational proficiency attained. There is an *a priori* likelihood in this view. The parents of the children in Class A are more successful and prosperous than those in Class B. They are not persons living on inherited wealth, nor are they "tax-devourers;" they are persons whose superior worldly status is due to their own qualities, modified, of course, as all our careers are, by an element of luck and opportunity. So I shall conclude that, as far as this school is concerned, there is some *a priori* probability that the children of Class B are naturally, on the average, inferior to those of Class A; and that the results in differential attainment seem more likely to be dependent on inferiority of natural ability than on educational environment.

(To be continued.)

THE FUNCTION OF EXPERIMENT IN EDUCATIONAL SCIENCE.

By H. BOMPAS SMITH, M.A.,
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At the present time we find teachers and other students of education taking up one of two antagonistic attitudes towards psychological experiment and the allied methods of psychological research. On the one hand, practical teachers are apt to look upon such experiments with indifference, if not with positive dislike; and, on the other, enthusiastic students of psychology appear at times to regard their laboratories as the only possible birthplace of a regenerated science of education. Some opponents of experimental methods are doubtless influenced mainly by unreasoning prejudice; and even if this is not the case, their disbelief in the value of such experiments is rarely based upon any intimate knowledge of the method they distrust; rather their disbelief is due to an instinctive feeling that the kind of knowledge which experiments can give will help them little in the most important department of their work. They feel that their whole attitude towards their boys' mental life is different from that of the typical student of psychology, and the result is too often a rooted antipathy to psychology and everything connected with it.

On the other side we sometimes find the advocates of experimental methods in education tending to ignore the limits within which these methods can be usefully applied. I do not know whether Professor Thorndike, for example, really intends us to look upon education as an exact science like astronomy or physics, but at any rate the following quotations taken by themselves serve to represent that point of view. "If there existed," he says, "a perfect and complete knowledge of human nature—a complete science of psychology—it would tell the effect of every possible stimulus, and the cause of every possible response in every possible human being. The teacher could then know just what the result of any act of his would be, could prophesy just what the effect of such and such a page read, or punishment given, or dress worn, would be—just how to get any particular response, of attention to this object, memory of this fact, or comprehension of that principle."[1] And again: "It" (a complete science of psychology) "would aid us to use human beings for the world's welfare with the same surety of the result that we now have when we use falling objects or chemical elements. In proportion as we get such a science we shall become masters of our own souls as we are now masters of heat and light."[2]

Now, these two points of view, that of the practical teacher and that of the psychologist, are based upon two different conceptions of the matter with which education deals and of the methods appropriate to its investigation. The advance of any science is marked by the emergence of new concepts, points of view, and provisional hypotheses, and these in turn give rise to fresh methods of discovery. The atomic theory in chemistry may be cited as an example. In the comparatively undeveloped science of education the fundamental concepts are still ill-defined, and the corresponding methods of inquiry have not yet been brought into harmony with each other. Hence it is not surprising that we should have a conflict of views regarding fundamental principles. The old-fashioned teacher regards his boy primarily as a unique individual person; his knowledge of this person is obtained by means of personal sympathy; he values this knowledge because it helps him to influence the boy in the direction he desires. The experimenter, on the other hand, tends to fix his attention in the first instance upon the particular processes going on in the boy's mind; he analyses these processes, and ascertains how far they are uniform in different individuals. His results are gained by what we may roughly call the methods of physical science: his purpose is not to attain to knowledge which will serve as a guide in practice, but to contribute fresh facts or principles to scientific theory.

I believe that the progress of education is, under existing conditions, seriously retarded by the antagonism between these two points of view. But this antagonism will cease only when a satisfactory logic or methodology of education has been worked out, and the different concepts and methods co-ordinated as parts of one coherent system. When this has been accomplished we may hope for a general agreement of aim and method, such as we now find among students of natural science. The present paper offers a small contribution to such a logic by briefly considering the place which should be assigned to experiment among the various methods at the disposal of educational science. The results arrived at will be necessarily provisional, and greater knowledge would doubtless change the perspective, but there seems to be a special need at the present

[1] Principles of Teaching, page 9.

[2] Journal of Educational Psychology, January 1910, page 6.

time for the discussion of principles of method from various points of view, and this must be my excuse for speaking of a subject with the psychological side of which I am imperfectly acquainted.

It will be necessary to limit ourselves to one part of the field, and I shall not attempt to discuss the bearing of experiment upon the determination of our educational aim, nor upon the problems of educational organization. All I can do is to make some remarks upon the value of experiment as one method by which the teacher can gain a knowledge of his boys' mental life. This is after all the branch of educational science in which the method of experiment seems likely to prove most effective. The experiments which fall within our purview will therefore be mainly of two kinds: first, experiments of the type carried on in psychological laboratories; and secondly, the class of experiment made by a teacher when he tries the effect of some change which he produces in the child's school environment. The determination of the course of muscular fatigue by means of the "ergograph" would be an example of the first type of experiment. Experiments with a view to determining the most economical method of learning a poem by heart would be examples of the second.

Further, I shall assume, without discussion, that the experimenter's mental attitude is necessarily that of the scientific investigator, that is, his main purpose is the increase of scientific knowledge by arriving at some result of more or less general application. If therefore we are anxious to cure a boy of the tendency to copy, and make various efforts to raise his standard of honesty, we are not trying experiments in the sense here given to the word, for our primary aim is not the increase of our scientific knowledge but the mental improvement of the boy. We may gain knowledge by careful observation of the results obtained, but that is a different matter.

The importance of the method of experiment is due to the fact that it is one of the most powerful instruments employed by natural science. In so far, therefore, as mental processes share the characteristics of natural phenomena, experiment is an appropriate means for their investigation. One of the chief causes of the progress now being made in the human sciences is the increased use of the methods elaborated by students of the natural world. This is true of psychology, sociology and history, and is, we hope, becoming true of education.

Now, from one point of view, all mental processes may be regarded as scientific phenomena in the sense in which we speak of phenomena in chemistry or physics. Hence the function of experiment in educational science is of incalculable importance. For so far as mental processes are concerned, experiment is one of the most widely applicable of scientific methods. We can always, or nearly always, experimentally investigate those fundamental relations between mental processes which belong to them as scientific phenomena.

Such relations are those dealt with by mathematics, size, number, order, and the like, or the relation of cause and effect, as conceived by natural science. To take a simple instance, we can discover by experiment the number of nonsense syllables that can be learned in a given time by the boys in a class; or we may determine the effect of a given change in our methods of teaching upon the marks obtained by the boys in some external examination. Roughly speaking, therefore, we may say that the method of experiment is appropriate to the discovery of those features of the boy's mental life of which the magnitude can be determined by the measurement of some corresponding physical change, and which are the result either of changes in the boy's environment or of some form of what may be called mechanical causation. Thus we may measure the strength of emotion by the corresponding acceleration of the pulse, or we may try the effect of different sizes of print upon the speed with which a boy can read. Experiment is therefore likely to throw light upon questions of physical fatigue, of the proper length of school hours, and other points connected with the organization and material conditions of the school. It may also tell us a good deal about the characteristics of individual boys, enabling us, for instance, to classify them according to their mental types, or their ability in certain definite directions. Speaking generally, it may be expected to increase our knowledge of the growth and mutual relations of all mental processes. In particular, it will enable us to test the effects of different methods of teaching and of alterations in the curriculum. And these are only a few of the innumerable questions which we may look forward to having some day settled by the use of experimental methods.

But while the field in which the method of experiment can be applied is both extensive and important, it does not include the whole of education. The applicability of the methods of physical science, and of the method of experiment in particular, is subject to limitations. For owing to the nature of the methods themselves they cannot be used for the investigation of what we may call the subjective aspects of the world of mind, and these aspects are precisely those which are of the greatest significance in education. The knowledge we require as teachers is not the knowledge of the boy's mental processes considered simply as objective facts; what we desire is such a knowledge of the boy's mind as will help us to educate him properly. We are therefore primarily concerned with his mental processes in so far as they have a value for our educational aim. We shall ask what is the intellectual or moral or æsthetic value of a given process considered as an element in the boy's inner life, and how far it offers possibilities of further mental growth. Take, for instance, the question of the accuracy with which a boy gives an account of some experience through which he has passed. The researches of Stern and others have shown that the boy's accuracy or inaccuracy is largely determined by psychological considerations capable of more or less exact determination and explanation. Their experiments have led to some valuable results, but the moral question of truth or falsehood does not arise in their inquiries. For a teacher, on the other hand, the moral question is fundamental, and he will value the knowledge gained by experiment in proportion as it enables him to enter into the boy's point of view, and judge how far the boy has really made an effort to tell the truth. He will then be in a position to decide how best to develop in the boy a habit of accurate statement. Throughout he will consider the boy's statements less as objective facts than as expressions of impulses and motives which have a moral value or are capable of moral training.

Now with this question of the value of mental states or processes experiment does not deal, and if we are to investigate it successfully our attitude must be distinguished from that of the psychologist. We must take an interest in the boy as a living person, sympathetically interpreting his mental life, and making his point of view our own. Only when we have done this can we truly judge of the value of his acts.

It follows therefore that the methods of educational science will be the expression of both the attitudes of mind referred to at the beginning of this paper. There is room for the attitude of the experimenter who employs with certain modifications the methods of physical science, but there is need also of the attitude of sympathetic insight which gives us a different kind of knowledge by methods of its own.

Of these methods the most characteristic may be summed up under the two heads of " Interpretation " and " Evaluation."[1] Under the head of Interpretation fall all the special methods by which we gain an insight into the boy's subjective experience, and view his mind as it were from the inside. From the physical expression of his mental states we infer the character of his thoughts and feelings, and this we can do in virtue of our own conscious experience. We realize his mental state by to some extent reproducing it in ourselves. It is this feature of the method of Interpretation which differentiates it from the methods of physical science. For Interpretation is an exercise of our sympathetic insight, not of our scientific curiosity. Still, though Interpretation is itself a much more personal process than is the process of experiment, it has its own methodology, and is carried out mainly by the methods of psychological analysis and comparison. Suppose, for instance, we have to deal with a class of boys who show a tendency to crib. Our general procedure will probably be to compare the circumstances and mental history of this class with those of other classes which do not betray a similar tendency. We shall thus be enabled to analyse the form's mental attitude, and discover, for example, with what emotion their untruthfulness is connected. This knowledge we shall then apply to the explanation of their failure to practise honesty in their work. Throughout our attitude will be not that of scientific experimenters, but of interpreters of their experience by our own.

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[1] Wundt, from whose discussion of the logic of mental science I have borrowed freely, calls the methods Interpretation and Kritik. See his "Logik," Vol. 3, p. 78, ff.

But the knowledge gained by Interpretation is not sufficient for the purpose of education. We have also to ascertain the relative or absolute value of the boy's mental processes as tried by our standard of truthfulness, moral goodness, or beauty. This we accomplish by what I have called the process of Evaluation. In many cases, for instance in the above example, Evaluation can hardly be distinguished from Interpretation, but in other cases it demands separate attention. It is by no means easy, for instance, to determine how far a boy's imperfect conceptions have truth for him, or how far some action is in accordance with his standard of ethics. To take a definite example, a boy's action in reporting some serious school offence of which he has been a witness may be evidence of his failure to live up to that form of tribal morality obtaining in ordinary school life, or it may show that he has risen above this level, so that his action is prompted not by disloyalty to his fellows but by a conviction that he is really promoting the welfare of the school. To decide questions of this kind we must re-examine the various mental processes which Interpretation has made known to us, and thence deduce the value to be attributed to the boy's thought or action. But here, too, our attitude remains the same: our results are derived from insight, not directly from experiment.

In this brief attempt to outline the methods by which we obtain a knowledge of our boy's mental life, many questions of importance have necessarily been passed over. There is, however, one objection to the view here taken upon which a few words must be said. It may be urged that the class of methods last discussed do not give us knowledge that is scientific, inasmuch as their main result is merely to help us better to understand individual boys, while they throw light only indirectly upon general scientific principles. This, I believe, is more or less the attitude of the practical teacher who distrusts all psychology. He draws the conclusion that the knowledge he requires is not scientific knowledge in any sense, and that therefore a science of education based on scientific methods has no interest for him.

The reply to such an attack upon the scientific character of the methods of Interpretation and Evaluation may be summarized as follows. Science not only helps us to arrive at a knowledge of general laws, but has for one of its aims the truer comprehension of the significance of unique groups of facts. Thus, for instance, in history each situation is unique, yet the explanation of these unique situations is one of the objects aimed at by the scientific historian. Again, it is true that methods based on personal insight depend for their success largely upon the qualifications of the individual student, but this is no argument against their scientific character, for the same thing holds good to a greater or less extent of all scientific methods. Moreover, however gifted an investigator may be, his work will be rendered more effective if he is conscious of the methods he is using, and can therefore subject them to criticism and render them more complete. As a matter of fact, the methods of Interpretation and Evaluation have already produced valuable results where they have been employed, as, for instance, by some writers on Child Study,[1] and by men like Arnold, Thring and Edward Bowen. It is true that this branch of educational science is still in its initial stage. But enough has been done to warrant us in hoping for more rapid progress in the future.

The fact that experiment is only one amongst several methods by which educational science can be advanced does not, however, diminish its importance. It is by the use of experiment and other allied methods that the foundations of all human sciences must be laid; and if, as we have begun to see, the superstructure will be more extensive than we thought, there is all the greater need for the foundations to be broad and deep. I believe that if teachers as a body can be induced to take an active interest in experimental investigations which can be carried on in schools, the result would be an extraordinary improvement in every department of their work, due both to the results obtained, and also to the scientific attitude of mind which would be thus induced. But I am also sure that we can ill afford to lose that tradition of personal interest in our boys which is perhaps the most valuable heritage of English schools and English teachers. This interest must not be diminished but increased, and will be made only more effective by becoming more scientific.

M. BINET'S METHOD FOR THE MEASUREMENT OF INTELLIGENGE.—SOME RESULTS.

By KATHARINE L. JOHNSTON, B.A.,
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During the course of the past year, systematic trial has been made in Sheffield of M. Binet's method for estimating the level of intelligence. It is with the results of this investigation and the conclusions to which such results seem to point, if one is justified in speaking of conclusions when the field of research is so restricted, that the present paper deals.

The work done has been solely among girls, the reason for the limitation being the desire to avoid any circumstance which might occasion shyness or diffidence on the part of the child examined. Some attempt was made to draw the subjects from different classes of society, and 25 of the 218 examined were girls of High School grade, the others attended Elementary Schools. Their ages varied from 6 to 16 years.

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[1] For instance, in Stanley Hall's "Adolescence."

The best introduction to the points with which I am anxious to deal in this paper is a summary of the results obtained. In making it, I am assuming that my readers understand the method of estimating the intellectual level of a subject as set forth in my paper in the last number of the Training College Record.

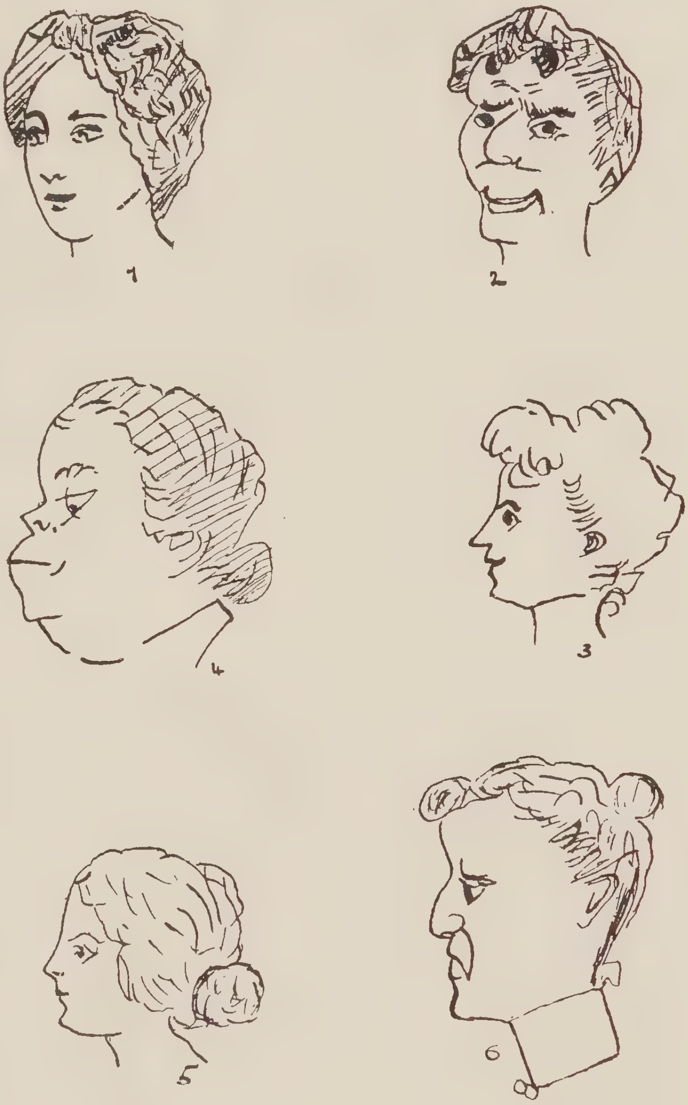

Fig. 1.
(Tests for 6 years old.)

Of 4 girls of 6 years old—

2 can do the tests for 6 years,
2 have to go back,
when allowance has been made for the tests superior to the level at which the child does *all* the tests or *all but one*,
3 emerge at levels superior to that of 6 years,
1 would have reached the level of 7 by the accomplishment of one more test.

Of 41 girls of 7 years old—
(see fig. 2)

9 can do the tests for 8 years,
6 can do the tests for 7 years,
26 have to go back,
when allowance has been made,
Superior level,
22 reach levels superior to that of 7 years.
2 need but one test to reach the level of 8 years.
Equal level, 8 reach the level of 7 years.
Inferior level, 5 fail to reach the level of 7 years.
Special cases. {1 did the tests for 5 and 19 tests superior to that level.
{1 „ „ 5 „ 15 „ „ „
2 results were not calculated.

The test amongst those designed for this age which presented most difficulty was (i) Features missing in faces: 24 children failed to accomplish it; 19 failed in (viii) Naming 4 of the ordinary coins, and 18 failed in (v) Repetition of 5 numbers. The failures in any of the other tests were below 10.

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Of 22 girls of 8 years—

7 can do the tests for 8 years,
15 have to go back,

when allowance has been made,

Superior level,
6 reach levels superior to that of 8 years.
2 need but one test to reach the level of 9 years.

Equal level, 10 reach the level of 8 years.

Inferior level,
2 fail to reach the level of 8 years.
1 does the tests for 4 years and 23 tests superior to that level.
1 result was not calculated.

Of 30 girls of 9 years—

5 can do the tests for 10 years,
1 does the test for 9 years,
24 have to go back,

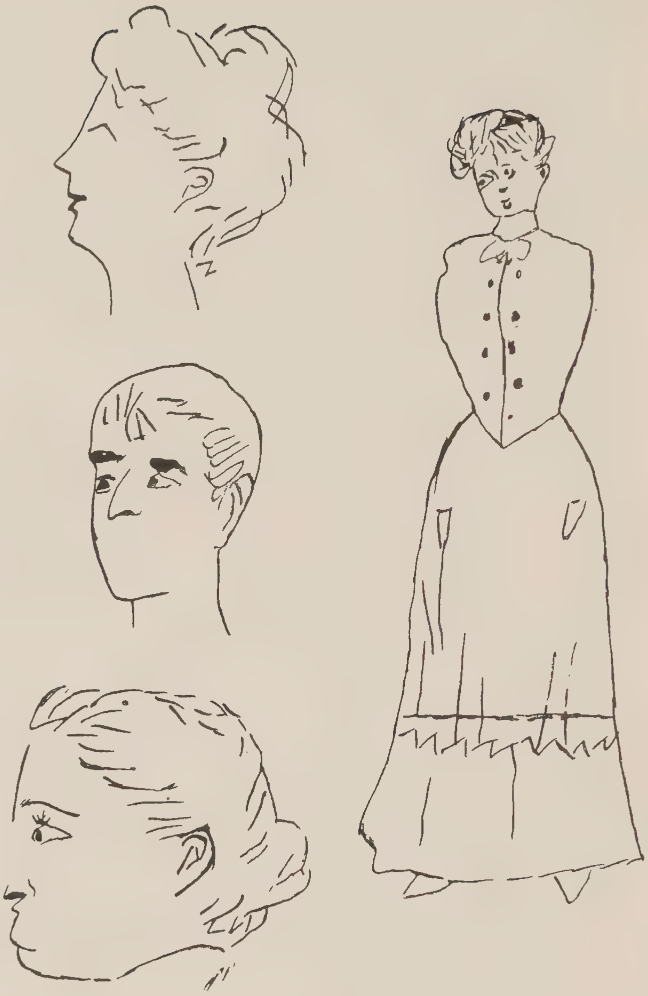

Fig. 2.
(Tests for 7 years old.)

when allowance has been made,

Superior level. 11 reach levels superior to that of 9 years.
1 needs but 1 test to reach the level of 10 years.

Equal level, 10 reach the level of 9 years.

Inferior level, 8 fail to reach the level of 9 years.

These 9-year tests appear to be the most difficult set. The greatest number of failures occur in (iii) Definition superior to use—in which there are 23, and in (vi) Arranging 5 boxes in order—in which there are 21. Test (v), Giving of change—comes next with 16 failures, and (iv) Reading of a passage and recollection of at least 6 facts—causes 14.

Of 38 girls of 10 years—

12 can do the tests for 10 years,
26 have to go back,

when allowance has been made,

Superior level. 4 reach levels superior to that of 10 years.
2 need but one test to reach the level of 11 years.

Equal level, 12 reach the level of 10 years.

Inferior level, 17 fail to reach the level of 10 years.

3 results were not calculated.

Test (v), the second series of questions, is responsible for the greatest number of failures, as many as 26; (iii) the Composition of the sentence—accounts for 21 failures, and (ii) Naming of coins—for 19. No one failed in (i) Enumeration of the months of the year.

It is difficult to find a satisfactory form for the statement of the results of the examination of the 29 girls of 11, as there are no tests specially designed for that age.

1 can do the tests for 15 years,
6 ,, ,, ,, 12 ,,

the remainder have to go back to the 10 year tests.

It will be observed that the omission of tests for 11 years introduces a difficulty in assigning an exact age which has not occurred before.

Of 24 girls of 12 years—

1 does the tests for 15 years,
5 do ,, ,, 12 ,,
18 have to go back,

when allowance has been made,
Superior level, 1 reaches a level superior to 12 years.
Equal level, 5 reach the level of 12 years.
Inferior level, 15 fail to reach the level of 12 years.
3 results were not calculated.

Test (iv), Abstract definitions—was responsible for a great number of failures, 21 in all; (v) Re-arrangement of words—accounted for 13; (ii) Composition of a sentence—caused 12; in (i) Criticism—7 failed, and in (iii) More than 60 words—5 failed.

Of 23 girls of 13 years—

4 can do the tests for 15 years,
10 accomplished those for 12 years,
9 have to go back.

There are no tests specially designed for the age of 13; to avoid misunderstanding I therefore omit any further calculation, as in the case of the 11-year-old children.

Of 4 girls of 14 years—

1 does the tests for 15 years,
3 have to go back.

Of 3 girls of 15 years and over—

1 can do the tests for 15 years,
2 have to go back,

when allowance has been made,

1 reaches the level of 15 years,
2 fail to reach the level of 15 years.

The tests for over 15 proved stumbling blocks to them all.

A glance at these results is sufficient justification for the provision made by M. Binet, that an addition be made of 1 year for 5 tests, 2 years for 10 tests correctly performed in the ages superior to the level at which the child performs *all* the tests or *all but one*. Otherwise the judgment would be too severe. It is well perhaps to lay stress on this, as the uninitiated, glancing at the numbers of those who are able to do the tests appropriate to their age, and those who cannot do them, are prone to hasten to tell the investigator that all that has been done is to expose the stupidity of the children.

An interesting comparison suggests itself between the girls of High School Grade and those of the Elementary Schools. The former certainly did better than the poorest and most neglected children, and out of the 25 examined—

8 were above the level demanded by their age,
6 were at the level demanded by their age,
11 fell below the level required.

They found the advanced tests fully as difficult as did the children in the best Elementary Schools. A marked difference appeared in the child's behaviour under the circumstances. The Elementary School child replied without question if she knew, or if she did not know, remained silent, unwilling even to acknowledge ignorance. The other frankly confessed ignorance, or asked questions and used various arts to surprise one into more direction than one had given. Thus a child of 8 when asked, "What is a fork?" promptly replied, "What kind of fork?" and one of 9 confronted with the same question queried, "Do you mean what is it used for?"

In the course of my work I have found that a girl may fail in the tests of an inferior age, but satisfy those of a superior one. This occurred most frequently between the ages of 9 and 10; two girls of 9 could not do the tests for 9 years but accomplished those for 10, and three girls of other ages failed in the tests for 9, through which I, in curiosity, put them, though they were able to satisfy the tests of superior ages. There were also two cases of girls who could not do the tests for 10 but accomplished those for 12 satisfactorily, and one girl of 12 failed in the tests for 12 but did those for 15.

Two explanations present themselves. On the one hand it may be that the spirit of the tests is foreign to our children, and that the English rendering requires to be less of a translation. I can instance what I mean by referring to the illustrations which, I regret, for various reasons could not be published with my former article, and which I now present, by the kind permission of M. Binet.* The quaint appearance of the hand-cart drawn by the man and boy strikes these English children, some even go so far as to explain that the horse is being drawn on the cart instead of drawing it; few of them connect it with "flitting," as house-removing is termed here. Then the French prisoner has not the distinctive marks of the English prisoner. Among the tests for children of 12 comes that on abstract definitions. This seems to be entirely foreign to our girls, and the incidents narrated among the tests for 15 make little appeal to them. I did not attempt to translate the words "Paris, ruissean, fortune," out of which the French child is required to frame a sentence, but rendered the test

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* See Figs. 4, 5 and 6.

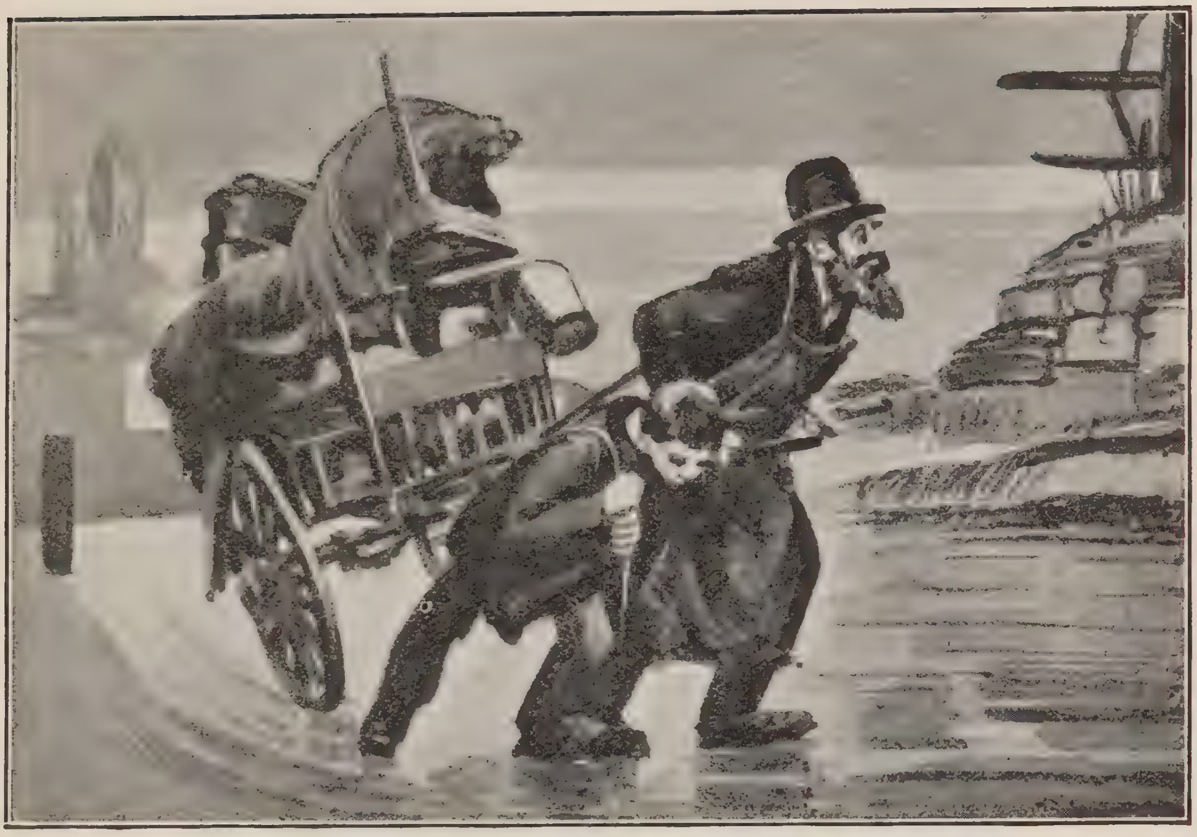


Fig. 4.

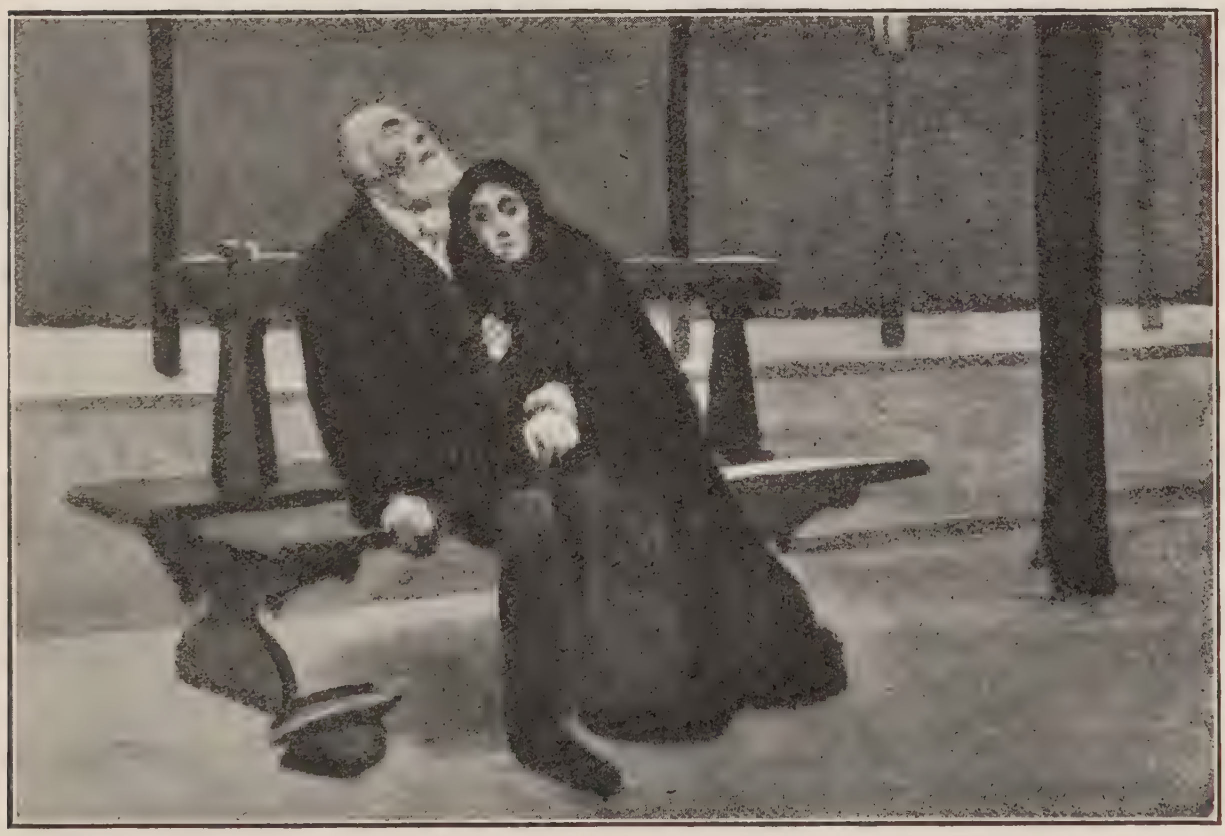


Fig. 5.

Fig. 6.

as the construction of a sentence involving the words "London, river, fortune." This was responsible, I think, for the difficulty I have mentioned of the girl of 12 who failed in the tests for 12 and accomplished those of 15. She composed the sentence "On London river I earned my fortune," a construction quite impossible in the test as designed for the French child, and one which I did not anticipate in English, but which has not unfrequently been offered to me.

This explanation, however, leaves untouched the cases of children who failed in the 9 year old tests, and yet were capable of satisfying the tests for superior ages, and it is these cases which suggest the need of another explanation—it may be the necessity for a revision of the tests for 9.

Another interesting inquiry centres round the comparison of the intellectual levels of those whom their teachers call bright and those whom they regard as dull. The prosecution of the inquiry, however, demands certain precautions. The simplest way of attacking it is to ask the teacher of a class for a list of those of his pupils whom he would designate as bright and those to whom he would apply the epithet dull, giving him clearly to understand that his judgment is desired from a general point of view, not from that of scholastic attainment. This list should then by revised by the investigator, for only those who are in a class higher than that attained by the average child of that age, and who are doing well in that class, are to be finally credited with the term bright. In the same way only those who are in a class lower than their age would naturally indicate are to be regarded as dull. These preliminaries over, the examination is begun, but in order that the investigator may have an open mind the name of the child under examination should not be demanded until the tests are completed. The comparison, moreover, of the difference in intellectual level between the bright and dull must be limited to children in the same school and children classified by the same master.

I am not in a position, as yet, to publish the results of such an investigation, but in the case of the girls who furnished the results summarized above, I suggested to myself the question of the correspondence, if any, between the results reached by this method of measuring the intellectual level and the opinion of those who know the subjects best—their teachers. In conducting the inquiry, the application of the terms bright and dull, as stated above, was adhered to as far as possible, but, as the teachers in the large city schools from which the majority of my subjects were drawn, pointed out to me, lack of accommodation in the higher class was frequently the reason why a child was denied the epithet bright when in the teacher's opinion she deserved it, if the appellation was to be so restricted. The results of the comparison, however, have not proved of much value. I do not find that the teacher's classification is always that which I have reached by means of the tests, though in the majority of cases in each school in which I have made the enquiry, it does. In the course of my work among the normal children two cases occurred—one, that of a girl of 12, who by this method of measurement was at the level of seven years; and another, a girl of 13, who possessed the degree of intelligence of an eight year old. Inquiry elicited the fact that these children, though included in normal schools for special reasons, had always been regarded by their teachers as seriously deficient.

In conclusion, I would emphasize the fact that the results I have furnished are those obtained from the examination of girls who were in no sense picked. It will be interesting to compare these results with a number obtained from the examination of the bright and the dull.

MEASUREMENT IN EDUCATION.

By Dr. P. SANDIFORD, Lecturer in Education, University of Manchester.

One of the marked tendencies of modern times is that of a more minute measurement and evaluation of products, objects and phenomena. In the world of manufacture and business the clumsy, easy-going measurement and book-keeping of a century ago would not be tolerated for a moment in the competitive atmosphere of to-day. Manufacturers and business-men are forced to keep track of all incomings and outgoings by means of elaborate devices in the way of registers, card indexes and so forth, in order to detect any waste or inefficiency in their businesses.

This tendency towards a finer measurement of products is exhibited in the academic world as well. In physics and engineering the minuteness of measurement has long been a source of wonder to the uninitiated layman. But progress in these spheres has been largely due to success in the manufacture of delicate measuring instruments. Before the invention of the thermometer, temperature was as elusive in measurement as mental traits were before the dawn of experimental psychology. Very hot, hot, tepid, cold and very cold were just as explanatory, or rather non-explanatory, of temperature as excellent, very good, good, fair and poor were of memory.

In the physical sciences the development of measurement has been a comparatively simple affair, although the invention of satisfactory electrical standards gave physicists a great amount of trouble. The task was, however, simplified by the kind of things the scientists had to measure—constants for the most part. Length and weight, the principal objects of their attention, are constant under constant conditions. And fairly constant conditions are relatively easy to obtain. Even errors of observation could be estimated and allowances made. But when we come to measurement of variable objects and phenomena, such as are illustrated by mental traits in animals (with man as the highest type), the task is complicated in many ways. In the first place, we have no standards—at least, no objective standards—which can be used as measuring sticks; in the second place, the things we measure are constantly varying because we cannot preserve or re-establish identical conditions. What standards can we use in measuring memory or piety, or excellence in school subjects? How impossible it is to make the memory of to-day equal to the memory of yesterday! Memory is a variable quantity. And so with all mental traits.

As measurement in education is chiefly concerned with measurement of mental traits, the problem reduces itself to measurement of variable quantities, the results of which must be treated statistically before the mind can grasp their significance. Recent text-books in education, and especially those in the field of educational psychology, are filled with formulæ and statistics illustrative of modern attempts to introduce measurement into this field. These formulæ and statistical results often appear difficult, but they are not really so; the difficulty disappears as soon as they become intelligible. The absence of elementary, non-mathematical text-books on statistics has been the chief source of the trouble, but this bids fair to be remedied in the near future.

Meanwhile, it may be of use to explain and illustrate in simple fashion some of the more elementary terms used in measurement of variable quantities. This paper, therefore, without any pretensions to originality, will endeavour to define some of the more simple terms and give simple illustrations of methods of calculation which are generally adopted by statisticians.

Before proceeding to the definitions and calculations it may be as well to point out some of the difficulties in the way of measurement in education. These are: (1) Difficulty of the units of measurement used. The unit for spelling, one word; for arithmetic, one example; for school-administration, one scholar; for auditory memory, one word remembered, are all fictitious. Unequal things are counted as equal because they are possessed of the same name. As for school marks in general they are quite arbitrary, and not only does the standard vary between different conditions, but also at different times. Further, we have no units at all for measuring the degree of goodness, or badness, or timidity, or even the merit of handwriting or drawing. (2) The difficulty that numbers representing measures of mental traits seldom stand for exact quantities. For example, 5 may represent from 4·5 to 5·5 as in the measurement of length, measurement of reaction times, or in measurement of wealth in pounds sterling; 5 may mean from 5 to 6 as in the matter of problems right in an arithmetical test, or in the number of words remembered in a memory test; and 5 may also mean from 4 to 5 as in the recording of errors made in drawing one line equal to another, or in the recording of times in races. The third method, that of the point just not reached, seldom occurs in educational measurements; the second, where 5 stands for 5-6, is by far the most common. "It is necessary to get into the habit of thinking of figures as measures on a continuous scale representing the quantities between two limits." (3) Mental measurements often exhibit an undistributed zero, i.e., a zero which is not absolute, but which may extend for some indefinite distance below a theoretical zero. For example, a class of 1,000 pupils may have a test in the shape of 20 arithmetical examples to be done in a certain time. Some of the pupils will get 20 right, others 19, 18, 17, and so forth to zero. But the pupils who fail to get no examples in arithmetic correct are not of equal degrees of weakness below those who get only one example correct. The zero in this case is undistributed. (4) Mental measurements are usually in a continuous series (as opposed to discrete). Intellect, wealth, reaction-time, timidity, velocity, time, length, weight, goodness and badness are theoretically capable of any degree of subdivision. (6) The difficulty of getting a reliable scale of measurements. Scales are so often the result of an individual's chance bias, or they are influenced by some constant error, or they are not on a sufficiently minute scale.

As was previously stated, mental traits are variable. They are, therefore, best graphically represented by a "surface of frequency" or "distribution curve."

Table I.—Heights and Weights of 50 Manchester Grammar School Boys. (Mumford).

(1) No.	(2) Height in inches.	(3) Deviations d_1 or x.	(4) d_1^2 or x^2	(5) Weights in lbs.	(6) Deviations d_2 or y.	(7) d_2^2 or y^2	(8) $d_1 d_2$ or $x.y.$	(9) g.
1	53	−6	36	61·5	−38·5	1482·25	+ 231	
2	53·25	−5·75	33·06	64·5	−35·5	1260·25	+ 204·12	
3	54·75	−4·25	19·06	76	−24	576	+ 102	
4	56	−3	9	84	−16	256	+ 48	
5	56·75	−2·25	5·06	77·5	−22·5	506·25	+ 50·625	
6	57·5	−1·5	2·25	75	−25	625	+ 37·5	1
7	57·5	−1·5	2·25	78	−22	484	+ 33	
8	57·75	−1·25	1·56	87·5	−12·5	156·25	+ 15·62	
9	57·75	−1·25	1·56	88·5	−11·5	132·25	+ 14·375	
10	58	−1	1	74	−26	676	+ 26	6
11	58	−1	1	81	−19	361	+ 19	
12	58	−1	1	82·5	−17·5	306·25	+ 17·5	
13	58	−1	1	92	− 8	64	+ 8	
14	58	−1	1	73·5	−26·5	702·25	+ 26·5	11
15	58·25	− ·75	·56	75	−25	625	+ 18·75	9
16	58·5	− ·5	·25	82·5	−17·5	306·25	+ 8·75	2
17	58·5	− ·5	·25	94	− 6	36	+ 3	
18	58·5	− ·5	·25	81	−19	361	+ 9·5	6
19	58·5	− ·5	·25	90	−10	100	+ 5	
20	58·5	− ·5	·25	86·5	−13·5	182·25	+ 6·75	
21	58·75	− ·25	·06	83	−17	289	+ 4·25	6
22	59·5	+ ·5	·25	84	−16	256	− 8	5
23	59·5	+ ·5	·25	95	− 5	25	− 2·5	
24	59·75	+ ·75	·56	107	+ 7	49	+ 5·25	
25	60	+1	1	87·25	−12·75	162·56	− 12·75	3
26	60	+1	1	89	−11	121	− 11	1
27	60	+1	1	91·5	− 8·5	72·25	− 8·5	
28	60	+1	1	87	−13	169	− 13	7
29	60·5	+1·5	2·25	92	− 8	64	− 12	
30	61	+2	4	86	−14	196	− 28	11
31	61	+2	4	98	− 2	4	− 4	
32	61	+2	4	92·5	− 7·5	56·25	− 15	2
33	61	+2	4	96	− 4	16	− 8	
34	61·25	+2·25	5·06	75·5	−24·5	600·25	− 54·125	27
35	61·25	+2·25	5·06	92·5	− 7·5	56·25	− 16·875	4
36	61·5	+2·5	6·25	101	+ 1	1	+ 2·5	
37	61·5	+2·5	6·25	99	− 1	1	− 2·5	1
38	61·75	+2·75	7·56	102	+ 2	4	+ 5·5	
39	62	+3	9	99	− 1	1	− 3	2
40	62·25	+3·25	10·56	106·5	+ 6·5	42·25	+ 21·125	
41	62·25	+3·25	10·56	104	+ 4	10	+ 13	
42	63	+4	16	118	+18	324	+ 72	6
43	64·5	+5·5	30·25	85	−15	225	− 82·50	25
44	64·75	+5·75	33·06	102	+ 2	4	+ 11·5	3
45	65·25	+6·25	39·06	99	− 1	1	− 6·25	7
46	65·5	+6·5	42·25	105·5	+ 5·5	30·25	+ 35·75	3
47	66·25	+7·25	52·56	124·5	+24·5	600·25	+ 177·625	
48	67	+8	64	118·5	+18·5	342·25	+ 148	1
49	67·5	+8·5	72·25	134·5	+34·5	1190·25	+ 293·25	
50	68·75	+9·75	95·06	125	+25	625	+ 243·75	1
			644·77			14642·06	$\underbrace{-288{\cdot}00+1918{\cdot}49}_{+1630{\cdot}49}$	150

Consider Table I. In columns (2) and (5) are given the heights and weights of 50 boys of the Manchester Grammar School between

Fig. 1.

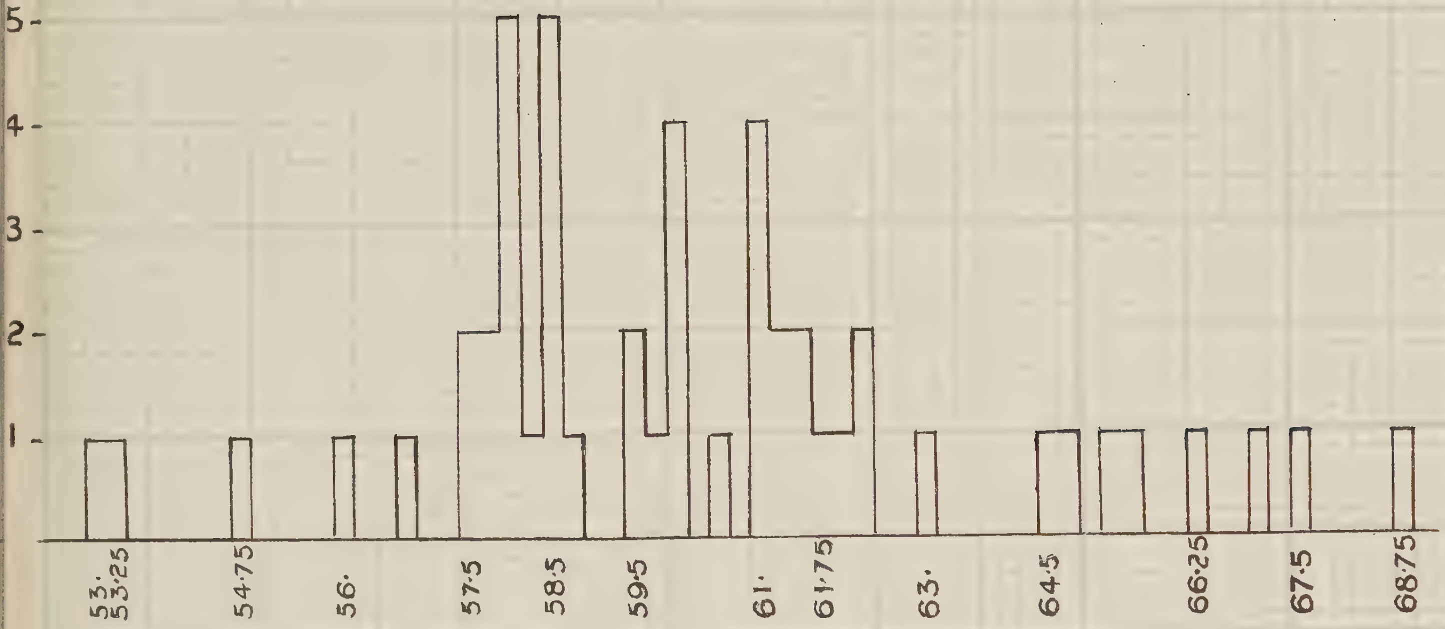
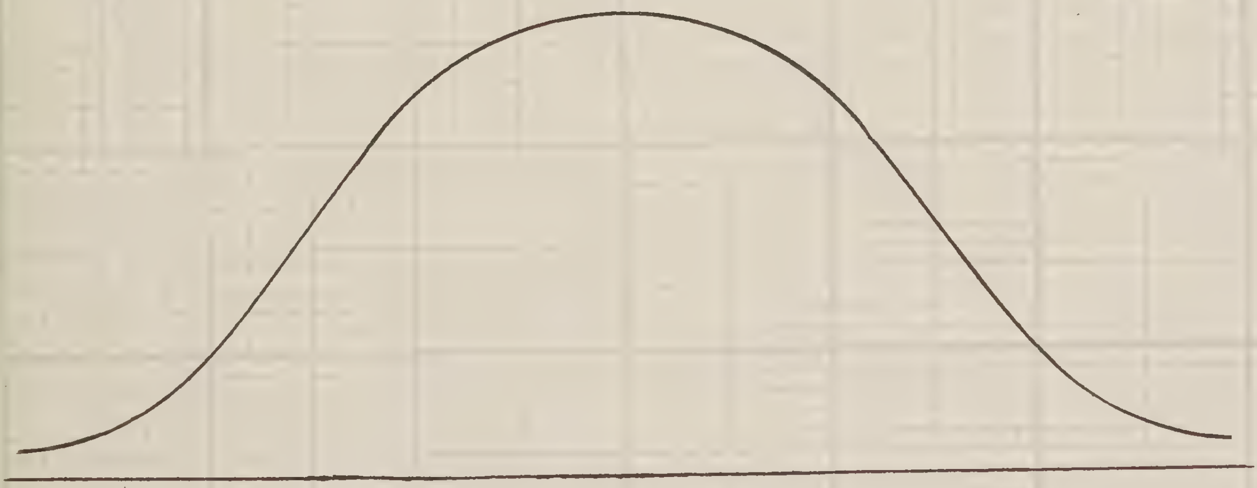


Fig. 2.



the ages of 14 and 14·25. Table II gives the same information with regard to heights condensed into a Table of Frequencies.

Table II.—Table of Frequencies.

Frequency No. of Boys.	Quantity Heights of Boys.	Frequency No. of Boys.	Quantity Heights of Boys.
1	53	(21) 4	61
1	53·25	2	61·25
0	53·5	(15) 2	61·5
0	53·75	1	61·75
0	54	(12) 1	62
0	54·25	2	62·25
0	54·5	0	62·5
1	54·75	0	62·75
0	55	1	63
0	55·25	0	63·25
0	55·5	0	63·5
0	55·75	0	63·75
1	56	0	64
0	56·25	0	64·25
0	56·5	1	64·5
1	56·75	1	64·75
0	57	0	65
0	57·25	1	65·25
2	57·5	1	65·5
(9) 2	57·75	0	65·75
(14) 5	58	0	66
1	58·25	1	66·25
(20) 5	58·5	0	66·5
1	58·75	0	66·75
0	59	1	67
0	59·25	0	67·25
(23) 2	59·5	1	67·5
(24) 1	59·75	0	67·75
4	60	0	68
0	60·25	0	68·25
(22) 1	60·5	0	68·5
0	60·75	1	68·75

The following figure gives the same information in graphical form—horizontal distances represent heights, vertical distances the number of boys attaining the given heights. (*Fig. 1.*)

The figure is very irregular. This is due to the fewness of cases taken. We have reason to suppose that if the boys had been of one race and of the same social position, a much greater number of cases would have given a curve approximately like that in Fig. 2.

This bell-shaped curve is known as the normal surface of frequency, or the probability curve. In practice the normal surface of frequency is never met with, although close approximations are extremely common.

It is obvious that graphical representations of measurements, or even tables of frequencies, are too cumbrous to use with freedom. Hence numerical summaries of the main features of such tables and curves have been evolved. Two such statements or representative measures are necessary to give the main facts of the distribution: (1) a number representing the central or general tendency of the measures; (2) a number representing the degree of variability of the measures.

Measures of Central Tendency.—There are three measures of central tendency in common use—the average or mean, the median, and the mode.

The ordinary arithmetical mean (M) is obtained by dividing the sum of the individual measures (m) by their number (n).

$$M = \frac{\lesssim m}{n}$$

This method is long and tedious. The labour of calculation is minimized if the following method is adopted:—Arrange the numbers in the order of their amount; choose any number likely to be nearest the average (M_{approx}) add together, regarding signs, the deviations (d) from it of all the numbers; divide this result by the number of the measures the average of which you are obtaining (n); add the quotient to the chosen number.

$$M_{act} = M_{approx} + \frac{\lesssim d \text{ (algebraic)}}{n}$$

Thus, in column (3) of Table I are given the deviations of heights from M_{approx}, which, in this case, was chosen as 59. The algebraic sum of the deviations is 63·25 (− 35·25 + 98·5),

hence

$$\begin{aligned} M_{act} &= 59 + \frac{63{\cdot}25}{50} \\ &= 59 + 1{\cdot}26 \\ &= 60{\cdot}26 \end{aligned}$$

The weighted arithmetical mean, the third method of calculating the average, is serviceable as a short cut in dealing with a large number of measures. The formula is the following:—

$$M = \frac{\lesssim (m.f.)}{n}$$

where n = measure of a limited group.
f = frequency of measure of limited group.
n = number of cases.

In finding the weighted arithmetical mean of the heights of the 50 boys, take measures 53, 55 and 57 as measures of the limited group. There are thus 2 cases at 53, 1 case at 55, 6 cases at 57, 15 cases at 59, &c.,

hence

$$\begin{aligned} M &= \frac{(53 \times 2) + (55 \times 1) + (6 \times 57) \cdot \cdot \cdot (3 \times 67) + (1 \times 69)}{50} \\ &= 60{\cdot}4 \end{aligned}$$

The method of the guessed average is the quickest of the three. Moreover, it has the special advantage of calculating the average deviation (see below) at the same time.

The *median* is the measure above and below which an equal number of the individual measures lie. Thus, a perpendicular erected at the median bisects the surface of frequency. The median is the $\frac{n+1}{2}$th measure.

The simplicity of calculation of the median and its unambiguity makes it the most desirable central tendency to use in statistical investigations.[*]

The method of calculating the median is to take the table of frequencies (Table II) and count in from either end of the frequencies until half way (25 in this case) is almost reached; 24 brings us, counting in from the lower end, to the end of the measure (59·75). It will thus be seen that the median falls in the group "4 at 60." Since, however, 60 means from 59·875 to 60·125 we must find out how far into this group we must go before the 25th case is reached. Obviously we have to go $\frac{1}{4}$ of the distance between 59·875 and 60·125, i.e., ·0625. The median is thus ·0625 past the end of the 59·875 measure, or is at the point $59{\cdot}875 + {\cdot}0625 = 59{\cdot}9375$.

The *mode* is the most common of the individual measures. In the table of heights the mode is not well defined. It may be said to lie between 58 and 58·5.

In normal distributions, the mode, median and average coincide.

Measures of variability.—There are three measures of variability in common use—the average deviation, the standard deviation, and the probable error.

The average deviation or *mean variation* (A.D. or m.v.) is the average (arithmetical) of the deviations (d) of the individual measures (m) from their average (M).

$$\text{A.D. or m.v.} = \frac{\lesssim (M - m)}{n}$$

$$= \frac{\lesssim d}{n}$$

Between M − A.D. and M + A.D. are 57·6 of the cases if the distribution is symmetrical and the observations sufficiently numerous.

In the case of heights, the sum of the deviations from the guessed average (this is approximately equal to the sum of the deviations from the actual or true average) was 98·5 + 35·25 or 133·75,

hence $$\text{A.D.} = \frac{133{\cdot}75}{50} = 2{\cdot}675$$

The wider the distribution the greater is the A.D. or other measure of variability.

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[*] The median is not so greatly affected by extreme measures as is the average. An average income of £200 per year of ten men may mean that one has £2,000 per year and the remaining nine nothing. The Hindoos have a proverb which states that "the cow was drowned in water of average depth up to the hoofs." The sportsman who shot a yard to the right of the duck with the right barrel, and a yard to the left with the left barrel, shot the duck on the average, but nevertheless it flew away and escaped.

The *standard deviation* or *error of mean square* (S.D. or σ) is the square root of the average of the squares of the individual deviations from their central tendency (usually M is used).

$$\text{S.D. or } \sigma = \sqrt{\frac{\Sigma d^2}{n}}$$

The S.D. of a given series is somewhat larger than its A.D. Theoretically, and practically also if the distribution is symmetrical and the observations sufficiently numerous, the relation is constant at

$$\sigma = 1{\cdot}25331 \text{ A.D.}$$

and conversely $\quad \text{A.D.} = {\cdot}7979 \ \sigma$

Between $M - \sigma$ and $M + \sigma$ are 68·2% of the cases.

Column (4) of Table I gives the squares of the individual deviations.* The sum of these is 644·77.

hence

$$\sigma = \sqrt{\frac{644{\cdot}7}{50}} = \sqrt{12{\cdot}894} = 3{\cdot}59$$

(σ calculated from formula $\sigma = 1{\cdot}25331$ A.D. is 3·55).

The *probable error* (P.E.) of a distribution is the amount of difference from the average (or other central tendency) such that 50% of all the individual measures lie between M−P.E. and M+P.E. In other words, the P.E. is a value such that the number of measures that exceed it is the same as the number of measures that fail to reach it. For a normal distribution

$$\begin{aligned} \text{P.E.} &= {\cdot}6745 \ \sigma \\ \text{P.E.} &= {\cdot}8453 \ \text{A.D.} \\ \sigma &= 1{\cdot}4825 \ \text{P.E.} \\ \text{A.D.} &= 1{\cdot}1843 \ \text{P.E.} \end{aligned}$$

There are many methods of calculating the P.E. Probably the simplest method is to take the 25 and 75 percentiles (these are found in exactly the same way as the median, only 25 and 75 are taken instead of the 50 per cent.) and divide the difference between them by two. Hence

$$\text{P.E.} = \frac{75 \text{ percentile} - 25 \text{ percentile.}}{2}$$

In the case of heights in Table I,

$$\text{P.E.} = \frac{61{\cdot}75 - 57{\cdot}80}{2} = \frac{3{\cdot}95}{2} = 1{\cdot}975$$

(To be continued.)

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*The squares of all integer numbers up to 10,000 are given in "Barlow's tables."

THE EVIDENCE OF MENTAL FATIGUE DURING SCHOOL HOURS.

By GLADYS W. MARTIN, B.Sc.
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THE following experiments are concerned with two questions regarding Fatigue.

First, with regard to the variations that occurred in certain tests for fatigue during the school day;

Secondly, whether these variations were significant and consistent.

The Experimental Conditions.

The subjects were girls chosen from the fifth standard of an Elementary School, seven in number, varying in age from 12 to 13 years. These were selected by the head mistress on account of their capacity for steady work, regularity in attendance, and also because in each case they came from a well-conducted home. Hence errors due to idleness, malnutrition, or want of sleep were avoided as far as possible.

The tests were made in the morning at 9.45 a.m., 11.45 a.m., and 3.45 p.m. The children assembled at 9 a.m. for a daily Scripture lesson, which involved little mental exertion. By 9.45 a.m. they had time to recover from the effect of the run or walk to school, and had become accustomed to the temperature of the schoolroom. They were thus in a more normal state for experimental purposes than at 9 a.m. The second reading was taken just before the end of the morning school. The subjects were not detained longer than the other children, thereby avoiding the errors that would occur if the children were impatient and anxious to hurry home. Likewise the last reading was taken before the close of the afternoon school.

Only those observations that were made on the same day have been compared together. This has been found a most necessary consideration; all tests are influenced in some degree by variations in the daily condition of the subject or by a daily gain of practice. If the child was only present once instead of the two or three times that the particular experiment demanded, the reading for that day was discarded.

The Experimental Tests.

The tests that were chosen were the following:—

1. *Quickness and Accuracy of Perception.*

The subjects were given a pattern drawn on chequered paper in two colours. The pattern was thus formed of a definite number of complete squares, and was, as far as possible, homogeneous in difficulty, those chosen for the same day being of the same number of squares, only arranged differently. The subject was asked to copy the pattern on a similar sheet of paper as many times as she could in five minutes. It was necessary to analyze and grasp the given pattern in order to copy it. It was assumed that this mental process might be influenced by the fatigue or freshness in some consistent manner. When fatigued it was believed that the subject would take longer to grasp the arrangement, and would also reproduce incorrectly. Each square had to be drawn separately: this prevented mechanical errors which might arise by drawing one pattern by continuous horizontal or vertical lines, and therefore facilitating the copying of some patterns more than others in which the pencil had often to be lifted. It was hoped that this task would avoid the errors due to boredom. It would also involve no special mental ability and be homogeneous in difficulty.

It would possess the great advantage of being easily estimated numerically, each correctly finished square being counted as one.

2. *Variations in the Sensitivity of the Skin.*

The average of the threshold for "oneness" and the threshold for "twoness" was used as the threshold for comparison. Contact was made by placing the points of an æsthesiometer horizontally on the left zygomatic arch. Every care was taken that the points touched simultaneously and with equal pressure. The experimenter started with a distance distinctly above the threshold, and diminished this distance by 1m/m. until the threshold was reached. Again the child was given the points at a distance below the threshold, and the distance increased until two points could just be discriminated.

The average of these two values gave the threshold for comparison. This distance was read with the help of a vernier scale in tenths of a millimetre.

3. *Variations in Arithmetical Capacity.*

This was estimated by the number of multiplication sums worked in 15 minutes. The sums were worked in the books compiled by Kraepelin. The child multiplied three successive figures, and wrote the product by the side of the column. This method was used in order to determine the actual number of faults; the procedure adopted in experiments when only the unit was written down did not allow of possible mistakes in the carrying of the 10 or 100 digit. The objection as to the introduction of muscular fatigue due to writing is met by the fact that the time involved in the mental process of multiplication allows a rest between each sum.

4. *Variations in Muscular Capacity.*

This was tested (*a*) By recording the number of kilograms through the pressure of one grip of the right hand on the dynanometer.

(*b*) By recording the kilogrammetres, also the number and height of the flexions of the second finger by means of the ergograph designed by Kraepelin.

The Pattern Test.

In this test the speed and accuracy of the work done at the different times of the day were examined in order to see how far variations were consistent and correlated with the condition of the subject. The experiments were divided into two series.

In the first, it was not always possible to take the records three times during the day. They were consequently made either at 10 a.m. and 12 on one day or at 12 and 4 p.m. on another day. These two sets of records are considered as Part A and B of Series I.

The second series consisted throughout of three readings at 9.45, 11.45 and 3.45 p.m., taken on each occasion on the same day. It was hoped that the results of this series would be the means of confirming or rejecting any conclusions based on the results of the first series.

Results.

In Table I the average results are shown of all the readings taken at 10 and 12 o'clock, Part A.

The speed of the work is denoted by the number of chequers finished; the accuracy by the number of chequers in which faults occurred. These faults were either due to transpositions or to wrong colouring.

TABLE I.

No. of Subjects.	No. of Exp.	No. of Chequers.		No. of Faults.	
		10 a.m.	12	10 a.m.	12
7	46	159·4	174	2·64 %	1·90 %

The average results show that an improvement took place both in speed and accuracy at 12 o'clock. The next consideration was how far each individual shared in this improvement. In Table II the average results are given of each subject.

Improvement was characteristic of each subject in the matter of speed, and with two exceptions in the matter of accuracy.

TABLE II.

Individual Average Results.

Subject.	No. of Exper.	No. of Finished Chequers.		No. of Faults.	
		10 a.m.	12	10 a.m.	12
G.L.	6	215	251	4·0 %	2·0 %
B.B.	8	162	177	·9 %	1·9 %
G.B.	6	121	140	6·7 %	3·2 %
M.S.	7	159	201	1·8 %	·5 %
B.T.	7	137	184	·7 %	2·8 %
F.B.	6	159	182	1·4 %	1·3 %
M.H.	6	163	183	3·0 %	1·6 %

A further analysis is given in Table III showing how these averages are formed according to the number of times that improvement occurred. Considering the work of all the subjects, there is an improvement in speed equivalent to 89 % of the total number of experiments at 12 o'clock. As regards accuracy, the improvement is equivalent to 43%.

TABLE III.

The Number of times that improvement was found at 12 in accuracy and in speed as compared with the work at 10 a.m.

Subject.	No. of Exp.	Improvement in Speed at 12 o'clock.	Improvement in Accuracy at 12 o'clock.
G.L.	6	5 times	4 times
B.B.	8	6 ,,	1 ,,
G.B.	6	6 ,,	5 ,,
M.S.	7	7 ,,	5 ,,
B.T.	7	6 ,,	0 ,,
F.B.	6	5 ,,	1 ,,
M.H.	6	6 ,,	4 ,,

Deduction.

According to these results fatigue cannot be detected in the work at 12 o'clock by any deterioration in speed. In three of the subjects the faults almost regularly increase, but before assuming that this is due to fatigue it must be confirmed in Series II.

Part B. Series I.

An examination of the average results at 12 and at 4 p.m. show again an improvement in speed and accuracy at 4 p.m.: this is given in Table B.

TABLE IV B.

No. of Subject.	No. of Exper.	No. of Chequers Finished.		No. of Faults.	
		12	4 p.m.	12	4 p.m.
7	38	207	211·	2·2%	1·3%

The individual averages—see Table IV B and V B—show that this improvement in speed was characteristic of 5, and in accuracy of 5 out of the 7 subjects. The subjects B.T. and B.B., who failed in accuracy at 12 as compared with 10 a.m., show an improvement in this Series. Hence it is doubtful how far the deterioration was due to fatigue.

TABLE V B.

The Individual Average Results at 12 and at 4 p.m.

Subject.	No. of Exper.	No of Chequers Finished.		No. of Faults.	
		12	4 p.m.	12	4 p.m.
G.L.	7	240	226	2·4	1·4
B.B.	6	200	204	1·7	·8
G.B.	3	184	180	4·4	1·4
M.S.	4	235	268	1·4	·1
B.T.	5	149	163	2·9	1·7
F.B.	7	215	218	2·1	2·6
M.H.	6	219	220	·9	1·2

TABLE VI B.

The Number of times that improvement took place at 4 p.m. as compared with 12 o'clock :—

Subject.	No. of Exper.	Improvement in Speed at 12.	Improvement in Accuracy at 4 p.m.
G.L.	7	1 time	3 times
B.B.	6	3 „	3 „
G.B.	3	1 „	2 „
M.S.	4	3 „	3 „
B.T.	5	4 „	3 „
F.B.	7	4 „	2 „
M.H.	6	3 „	1 „

An analysis of the number of times that improvement took place at 4 p.m. shows that this is equivalent to 50% of the total number of experiments, and that there was an improvement in accuracy equivalent to 52%.

We have considered the average of the experiments at 10 a.m. and 12, and also at 12 and at 4 p.m.

If comparison be made by examining the percentage relation of the second to the first reading in each case, Table VII B, it is seen that the relative improvement in speed at mid-day is greater than the relative improvement at 4 p.m. In accuracy the improvement is greater at 4 p.m.

TABLE VII B.

Percentage Relationship of average readings at 10 a.m. and 12, and at 12 and 4 p.m. :—

	10 a.m.	12	12	4 p.m.
Number of Chequers...	100	109	100	101
Number of Faults......	100	72	100	59

It follows that there is no sign of failure in quickness or accuracy of perception after morning or afternoon school, as estimated by this test.

We shall now see how far this conclusion was confirmed by the Second Series.

Series II.

The same seven subjects consented to act in this experiment. Seventy-six experimental days were selected, in each of which the readings were taken at 9.45 a.m., 11.45 a.m. and at 3.45 p.m.

It will be seen from the individual average results that there is a constant improvement in speed at mid-day, and in accuracy with the exception of two subjects.

This improvement was not always continued at the end of afternoon school. The speed diminished in the case of 4 children; the accuracy diminished in the case of 6 subjects. The percentage relationship as given in Table VIII renders the relative proportion more obvious.

TABLE VIII.

Average Results in Speed and Accuracy at 10 a.m., 12, and 4 p.m.

No. of Subjects.	No. of Exper.	No. of Finished Chequers.			No. of Faults.		
		10 a.m.	12	4 p.m.	10 a.m.	12	4 p.m.
7	76	294	307·4	292·5	1·39%	1·39%	1·73%

According to the results shown in Table IX and X, there appears to be no question about the improvement at 12.

TABLE IX.

Average Results of Individual Subjects at 10 a.m., 12, and 4 p.m.

Subject.	No. of Exper.	No. of Finished Chequers.			No. of Faults.		
		10 a.m.	12	4 p.m.	10 a.m.	12	4 p.m.
G.L.	12	363	385	361	1·80 %	1·50 %	2·09 %
M.H.	10	303	336	299	·92 %	·86 %	1·10 %
F.B.	12	272	281	279	·61 %	1·30 %	·74 %
B.B.	11	313	318	322	1·10 %	·88 %	1·07 %
B.T.	11	267	287	247	·78 %	·69 %	1·30 %
G.B.	12	229	223	216	4·40 %	4·20 %	5·50 %
M.S.	8	311	332	324	·16 %	·33 %	·34 %

TABLE X.

Percentage Relationship of the Speed of Work at 12 and at 4 p.m. compared with that of 10 a.m.

Subject.	No. of Finished Chequers.		
	10 a.m.	12	4 p.m.
G.L.	100	105·8	99·4
M.H.	100	110·9	98·9
F.B.	100	103·4	102·7
B.B.	100	101·5	102·9
B.T.	100	107·3	92·3
G.B.	100	99·4	94·5
M.S.	100	107	104·3

The average results show a certain depreciation at 4 p.m., which took place 41 times out of the 74 experiments in speed and 50 times in accuracy.

The question arises how far this depreciation in speed and accuracy is a chance variation. To ascertain this the mean of the subjects' morning and afternoon work was calculated and the probable error.

In no case did the difference between the two means exceed twice the probable error.*

Hence it was concluded that the tendency was probably due to chance, and that the fatigue of the school day could not be estimated by diminution in the quickness and accuracy of perception.

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*The probable error was obtained according to the formula

$$\text{P.E. of } M_1 - M_2 = \sqrt{E_1^2 + E_2^2}$$

Where M_1 and M_2 = the two means respectively

$$\text{and P.E. of } M_1 = \cdot 6745 \times \frac{\sigma_1}{\sqrt{n}}$$

$$\text{and P.E. of } M_2 = \cdot 6745 \times \frac{\sigma_2}{\sqrt{n}}$$

$$\text{where } \begin{cases} n = \text{Number of cases.} \\ \sigma = \text{Standard deviation.} \end{cases}$$

(To be continued.)

THE PSYCHOLOGICAL BASES OF SCHOOL GEOGRAPHY.

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I.—Direction and Orientation.

The investigation of the psychological bases of instruction in contrast to *à priori* theorising had its birth in the scientific movement of the late 18th and early 19th centuries—the time of von Humboldt, Lavoisier and La Place. Kant and the great educational innovators, in accord with the spirit of the time, pleaded for experimental schools where methods of teaching might be investigated before being introduced into the ordinary schools. Basedow's great experiment failed, and Pestalozzi went astray in his effort to formalize instruction. Though the ideal of experimental schools has hardly yet been realized, the case for them scarcely needs to be restated.

Towards the close of the last century, a movement in favour of applying quantitative methods to educational problems began to gain in strength. The physical scientist held out an ideal, and Sikorsky's work in 1879 was a sign of the times. Work of the kind is best known in England through the investigation of Dr. Stanley Hall, who opened his "laboratory" in 1887, and of Earl Barnes. Enquiry has run in two directions according as the pedagogical or the psychological interest has been uppermost in the mind of the worker. It is not necessary to particularize researches into the psychology of the school child, but Huey's Psychology and Pedagogy of Reading (1908) may be instanced as an excellent example of the union of the two points of view.

The ordinary text-book of "method" is proverbially barren; it does little or nothing to illuminate the difficulties which perplex every thoughtful teacher in his class-room. It is the Specialist Associations which have in recent years done most to challenge school tradition, but they are apt to think too much of their subject and too little of children. In geography, there are only two accessible papers which approach the problem of instruction from a really psychological standpoint—a study of Children's Geographical Interests, by David Gibbs (*Pedagogical Seminary*, Vol. 14), and a very slight article by Miss Young in Vol. II of Earl Barnes' *Studies in Education*.

The present investigations were first begun some years ago in an attempt to solve a number of difficulties that were met with in teaching modern geography to primary school boys of 10-13 years of age, who had had the "orthodox" training. Experience has led to the belief that it is best to approach the subject by way of an investigation into the problems of direction and orientation, the problems centring round the map and the globe are in this way simplified, and the great questions of procedure, scope, and children's interests can then be approached with greater hope of success. No footrule capable of measuring minds has yet been manufactured, and no one who has honestly faced the problem needs to be reminded that children no less than adults differ enormously from day to day, and from hour to hour. For this, among other reasons, it is impossible to reduce to curvilinear form varieties in children's geographical intelligence. Nevertheless, investigation strengthens the belief that it is possible to indicate some general tendencies and to direct attention to difficulties and defects that lie at the root of current practice and incidentally to put forward suggestions calculated to remedy the more serious of them.

Comenius was the first to give any thought to the psychological foundations of geography. In his *Schola Infantiae* he remarks with much penetration: "The elements of geography will begin during the course of the first year and thenceforward, when children begin to distinguish between their cradles and their mother's bosom." In his view, the power to discriminate spatial relations is the beginnings of geography, and it will be generally agreed that space relations are for the child's practical purposes apprehended earlier than time relations. But mere discrimination is not enough, nor is it sufficient to retain mental images of such spatial relations. Some standard of reference is required if anything like control over these spatial elements is to be gained. The obvious way of doing this is by orienting everything with reference to oneself; such and such an object is in front, or behind, or it may be on one side. All this goes on so far as can be judged without any articulate reasoning as such on the child's part, and it is important to remember that the child's denotation of such terms is at once extremely vague, and very limited. In the ordinary course of events the child is taught, for convenience, to distinguish one hand from the other; thus he must hold the spoon in his right hand. He is now ready to make a further advance in orientation: this object is on the right hand side, and this on the left. Memory is largely responsible for the difficulties met with at this point. That there are real difficulties is borne out by introspection. Many if not most people remember the right and the left hand by means of association of some sort—the right hand is the one to write with, &c. In striving to overcome forgetfulness, teachers often lay up a store of trouble by associating in children's minds a definite direction as left or right. Thus children are asked to hold up their left hands, and to point to the wall that happens to be towards their left as they repeat: "That wall is left." The result is that the wall is remembered primarily, and though positions are changed a wall once labelled retains its character indefinitely. It is worth noting *en passant* that in many cases there seems to be no real purpose to justify teaching this convention of geographic right and left. At any rate, the children have not become conscious of the need. They learn to order, but with no enthusiasm, though with adequate drilling they become very proficient in indicating positions right or left.

The next step is to teach a standard method of orientation by means of north, south, east, and west. It is already obvious that several sources of later difficulty have arisen. What exactly does "in front," "behind," "to the right," to the left" mean? What sort of idea has the child got in mind? Does he regard "in front" as mere direction, or has it extension as well? Various attempts have been made to furnish an answer to these questions, and the following is typical of the methods adopted, and of the results. The questions were put orally either by the investigator or by the head teacher, as the circumstances seemed to demand. Answers were either written down on paper or, in certain cases, tested by show of hands.

Questions.

1. If I stand in the middle of this room, how much of the room lies to the right of me?
2. Ditto. How much lies in front of me?
3. You have said that that wall lies to the right of you. Is it the whole wall or only a piece of it that you mean?
4. Standing at A (Fig. 1), am I now standing to your right?
5. ,, ,, B, am I now standing to your right?
6. ,, ,, A, am I now in front of you?

Followed by similar questions for positions C, D, E and F. (Answers to *Q.* 4—10 were tested by show of hands.)

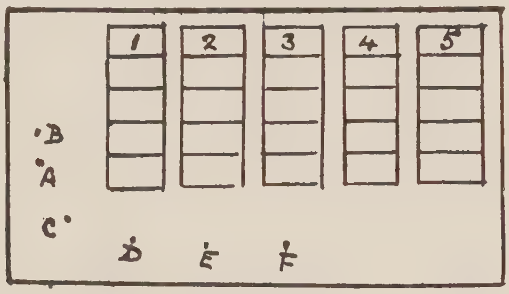


Fig. 1.

Results. STANDARD II (BOYS). 50 in Class.

1. 32 said half the room, 11 said quarter, 1 said "the left," 6 did not answer. (The children were now told by the Head Master which were correct.)
2. 41 said half the room, 9 said quarter.
3. 26 said the whole wall, 15 said half, 8 said "a piece," 1 did not answer.
4. 48 said No, 2 Yes.
5. 49 said No, 1 Yes.
6. 46 said No, 2 said "right," 2 said "half right and half in front."
7. 50 said No.
8. 50 said No.
9. 50 said No.
10. 50 said Yes.

STANDARD VI (GIRLS). 43 in Class.

1. 22 said half the room, 21 said quarter.
2. 24 said half the room, 19 said quarter.
   (In this case "south" was substituted for "front.")
3. 22 said the whole wall, 21 said "only part of the wall."
4. 30 said Yes, 13 No.
5. 30 said Yes, 13 No.
6. 40 said No, 3 doubtful.
7. 43 said No.
8. Girls in desks 1 said Yes, rest No.
9. Girls in desks 2 said Yes + 3 in desks 1, + 1 in desks 3, rest No.
10. 36 girls said Yes, 7 in desks 1, and 5 said No.

These results are thoroughly typical. Standard VI girls did worse than was expected, and though no particular stress need be laid on the actual figures they are useful in bearing out the results obtained on other occasions. This investigation took place in the morning when the children were fresh. The work was done under normal conditions, the only novel element being the type of question set. Individual cross-examination of the Standard VI girls brought out some interesting facts. Some admitted guessing in *Q.* 1

and 2. Others thought the room would be equally divided into four parts, one part being south, one right, one left and one north. One girl who gave this answer was unable to explain why in *Q.* 2 she should say that half and not quarter of the room was south; the difficulty did not seem to have occurred to her before. Another thought that half the room must be "in front" "because you can see it." Yet in *Qs.* 6—10 "in front" meant to her "directly in front."

In the investigations so far made the number of *correct* results in the higher classes does not show the improvement that might be expected. One head teacher explained this by pointing out that work of this kind is fresh in Standard II and is "forgotten" by the older children. Such an explanation directly bears out an opinion that has been developed during the course of the investigation. May it not be that the children are generally speaking working unintelligently? They have learnt something that has meant very little to them—either in itself or by way of results or consequences—the one aim is to satisfy the teacher, and so long as they are able to remember what has been taught all goes well. If this is a true explanation the percentage of correct answers should be directly proportional to the proximity of the children to Standard II. But increasing age would tend to yield results of an inverse order through the development of articulate reasoning. No attempt has been made to test this supposition owing to the large number of disturbing factors that in practice enter into the problem.

The next point was to investigate children's ideas of orientation with reference to the cardinal points. Several methods are in vogue for teaching these.

(1) By means of the compass.
(2) ,, ,, sun.
(3) ,, ,, north star.

On *a priori* grounds it would seem that the first of these methods is open to grave objection as it stands, for clearly the whole aim in adopting a standard method of orientation is to make use of some standard universally constant, in which case geographical and not magnetic orientation would be used. It seems a fruitful source of confusion to teach as north by compass a distance 16° or nearly ⅕ of the quadrant from north as determined by the sun. To say the least, clear ideas of south and *due* south are not likely to result, yet outside of the secondary school little importance seems to be attached to this. Thus the latest book on the teaching of geography only mentions the compass method of determining north, and seems to be unaware of any difficulties that present themselves (*vide* "The Teaching of Geography," by R. L. Archer, W. J. Lewis and A. E. Chapman, 1910, pp. 94-95, cf. too Tarr & McMurry's Geographies, First Book, p. 104). This point will be returned to later.

A series of questions was set to see whether children can readily interpret ordinary directions in terms of right and left.

*Q*1. A man goes south one mile and then turns east. Does he turn right or left?

*Q*2. If I face the sun at noon, on which side of me will the west lie?

These questions were written up on the blackboard one at a time, the children were given two minutes to study each, the answer was written down and the papers collected before the next question was exposed.

A few samples selected at hazard are typical of the series.

SCHOOL W.R. Std. V Girls, 57 in class. (Children had been 9 months in the class.)

	Ages	10	11	12	13	14	
	No. of Girls ...	7	33	11	5	1	
*Q*1.	No. incorrect...	1	16	3	2	0	= 38·6%
*Q*2.	,, ,, ...	4	25	7	5	1	= 73·6%

Std. VIII mixed, 27 children—17 girls 10 boys. Only 1 incorrect. and that in *Q*1.

School R. Std. IV, mixed, 56 in class.

	Ages	8	9	10	11	12	
	No. of Children	1	7	31	10	7	
*Q*1.	No. incorrect...	1	1	8	2	4	= 28·5%

Std. II, mixed, 47 in class.

	Ages	7	8	9	10	
	No. of Children ...	4	30	10	3	
*Q*1.	No. incorrect	0	17	1	2	= 42·5%
*Q*2	,, ,, ...	1	15	4	3	= 48·9%

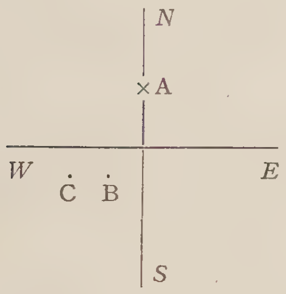
In both schools the questions were carefully gone over with the children afterward. Ten-and-a-half months later the following question was set to the Std. V girls, School W.R. above. They were then in Std. VI, and only 43 were present at the time, and they still had the same teacher:—

Q. Suppose I go east for a mile, then turn south. Do I turn to the right or to the left?

Result. 30 said right, 11 said left, 2 said "you can't turn either to the right or to the left?" = 27·9% incorrect.

It is difficult to offer any satisfactory explanation of these inaccuracies. Investigation has tended to show that some children when dealing with the cardinal points always picture themselves as facing the northward, others always face the sun at noon, but though this explains the answers of the two girls who in the last question say "you cannot turn either right or left," it does not explain why 11 should say left. It may be that they visualize directions very imperfectly, or merely that they have confused right and left. These results, however, are interesting as substantiating those derived from earlier investigations and already dealt with.

Perhaps the most instructive results were obtained in answer to the following questions:—



*Q*1. If you are standing in the middle of a room, how much of the room lies north of you? Draw a sketch if you like.

*Q*2. If you were standing at A, how would you describe the position of B with reference to C?

*Q*3. If you were standing at the city cross, describe the position of the river, the church, the jail, the fort (Fig. 2).

*Q*4. We say that the sun rises in the east and sets in the west. What do east and west mean when we say this?

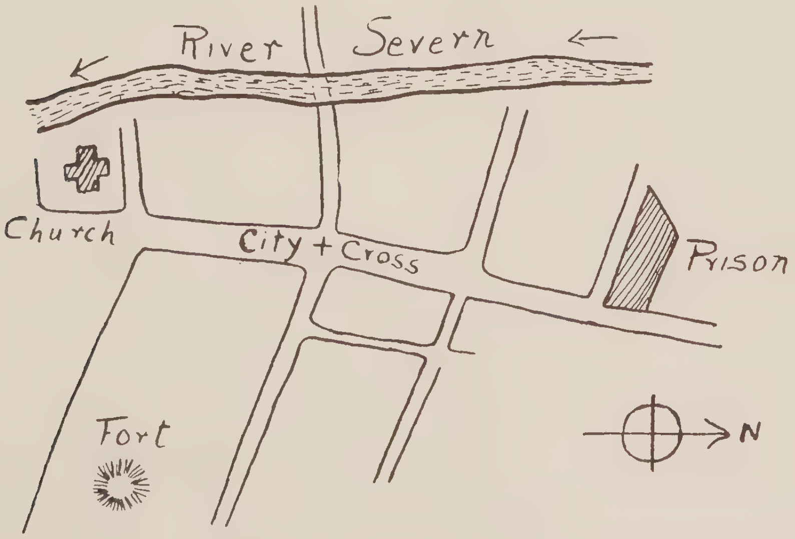


Fig. 2.

These questions were originally set in six schools, three primary and three secondary. The primary schools were of different types in a large manufacturing town. Of the secondary schools two were in a large seaport town, while the other was in a well-known cathedral town. All the schools would be classed as good. *Q* 1, 2, 4 were afterwards set in the middle forms of a large secondary school in one of the great manufacturing centres.

Careful instructions to the teachers accompanied the questions which were set simultaneously throughout the school.

The results of Q. 1 can most readily be studied from the following summary. To begin with, answers were classified under some 50 different headings, according to the type of answer given. It was then found possible to regroup these into some 20 typical classes. These were finally reclassified under the following heads :—

A. Correct—half the room (with or without showing idea of direct north).
a. Incorrect—but shows that these consider north as involving extension.
B. ,, —north means direct north only.
C. ,, —north is upward.
D. Not answered—" It depends on the shape of the room," " Where north lies," &c.
E. ,, —" The right of the room is north," &c.
F. Not attempted, or unfinished.
G. Meaningless—No meaning of any sort could be made of the answers.

Summary of Ages in each School.

Ages	7	8	9	10	11	12	13	14	15	16	17	18	19
Secondary School I 90 boys	—	—	1	2	6	11	27	26	8	5	4	—	—
Secondary School II 272 boys	—	—	—	—	11	51	88	67	46	6	2	1	—
Secondary School III 225 boys	—	—	—	1	11	64	47	59	34	5	4	—	—
Secondary School IV 135	—	—	—	—	—	—	4	29	67	26	8	—	1
Primary School V 591 boys and girls	11	80	105	132	118	99	37	7	2	—	—	—	—
Primary School VI *213 boys and girls	—	10	47	43	22	42	42	7	—	—	—	—	—
Primary School VII 281 boys	—	2	23	64	78	85	24	5	—	—	—	—	—

Total—1,807 pupils.

Summary of Results in percentages.

	A	a	B	Total.	A+a
Secondary School I ...	33·3	27·7	21·1	82·1	61·0
,, ,, II ...	40·8	40·4	17·4	98·6	81·2
,, ,, III ...	32·8	26·6	36·0	95·4	57·4
,, ,, IV ... (Not a complete school.)	27·4	18·5	46·6	92·5	45·9
Primary School V ...	24·7	36·2	6·9	67·8	60·9
,, ,, VI ...	26·2	34·7	19·2	80·1	60·9
,, ,, VII ...	30·2	43·4	5·6	79·2	73·4

The Primary Schools thus show a greater percentage of results in classes C, D, E, F, G. Secondary School I is peculiar in showing an undue proportion in class F. This accounts for the apparent discrepancy among the Secondary Schools. Primary School V is peculiar in showing quite an undue percentage of answers in classes E and F, 14% and 12·3% respectively. This is partly to be accounted for by a larger proportion of quite young children taking the paper. It will be noticed that a much greater percentage of Secondary School answers fall under B. Primary School VI seems in some ways an exception, though this is perhaps capable of explanation and will be dealt with later. The relation of members in A+a in the two grades of school is interesing.

As might be expected only a very complicated curve results from plotting the percentage of correct answers against the average age of each class,

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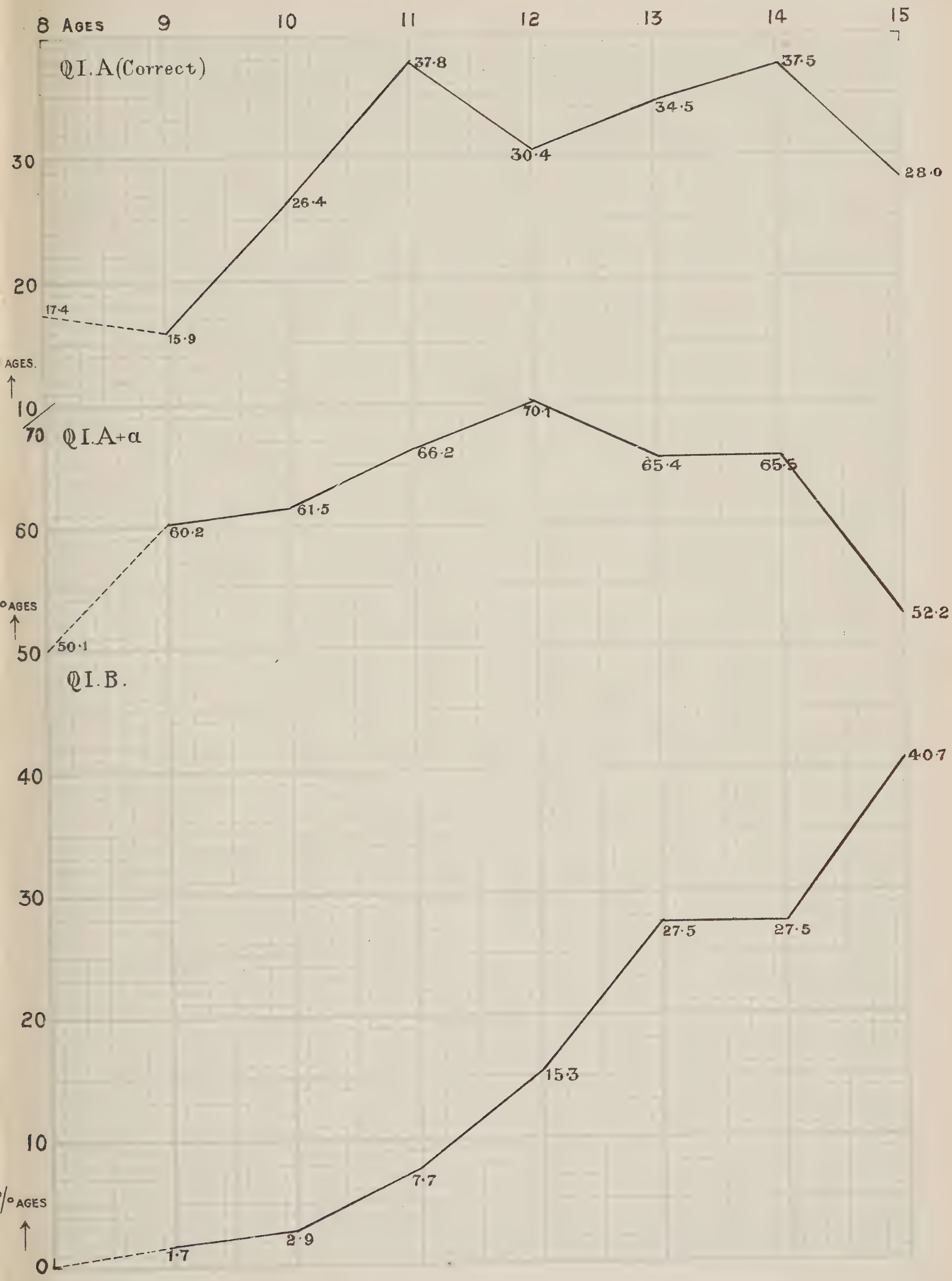
[*A whole class, 44 in number, was cut out, as the papers were of doubtful quality.]



Age 16—Curve A, 21·4%; A + a, 45·2%; B, 52·3%.

a good indication of the number of conflicting factors that enter into the problem. No regular graph results from plotting the percentage of correct answers against the position of the form in the school. More instructive curves resulted from plotting the percentage of answers in each of the above classes against the ages throughout each school. Care was taken only to plot groups large enough to be reliable: one-sixth of the total number in the school was the rough standard adopted. The curves obtained were of the same order for A, a, B, in Schools I, II, V, VI, and for Schools III and V. School IV does not afford a wide enough range to justify plotting. Certain general tendencies appeared to exist. These can be best studied by combining all the schools. The curves of importance are A+a and B, showing respectively the percentage of those who have the idea of north sa meaning extended north, or as direction only. A good proportion of those classed under A+a show by their answers that they distinguish between north and due north; and these increase, as might be expected, with age.

The difficulties such a question presents are illustrated by the following typical answers, in most cases illustrated by drawings:—

(*a*) $\frac{1}{16}$ lies north because the compass is divided in 16 parts.
(*b*) A certain point of the room—a point on the opposite wall on a level with your eye.
(*c*) It really depends how big we are to say how much of the room lies north, but in myself I think $\frac{3}{4}$ of the room.
(*d*) $\frac{1}{9}$ of the square room.
(*e*) 179·9 lie to the north—178° lie north.
(*f*) A piece half as long as the room and as wide as yourself.
(*g*) One-quarter of the room—$\frac{1}{4}$ of the volume of the room.
(*h*) It depends on the size of the room.
(*i*) If a line was drawn from you to the wall northwards, all parts which that line passed through would be to North.
(*j*) All points in the vertical plane from floor to ceiling running from you due north.
(*k*) One side of the room—one wall of the room—$\frac{1}{2}$ the wall of the room.
(*l*) All the part of the room you can see when facing north.
(*m*) A vertical line on the north wall—a line from your feet to the north, up the north wall and along the ceiling to a point over your head.
(*n*) The impression of my body on the north wall.
(*o*) The cylinder of which your body is one end, running due north.
(*p*) The ceiling is north—the top right-hand corner.

Of those giving a fraction of the room as north, the majority gave $\frac{1}{4}$. Very favourite answers were: "A straight line drawn from your feet to the wall"; "the north wall"; "one side." Quite a number of Secondary School boys explained that "no area of the room can lie north, as north is a direction."

Further discussion of these results and an examination of the remaining questions will be continued in the next number of the Journal.

MEMORY TRAINING—IS IT GENERAL OR SPECIFIC?

*Abstract of a paper read before the British Psychological Society, Jan. 21st, 1911.**

By W. G. Sleight.

The following experiments were part of research work done in connection with University College Psychological Laboratory, London.

I. Problem. Is the power to memorize, after being increased by practice in one particular material and by one method of presentation, transferable to any other material?

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* The Paper will appear in full in the forthcoming number of the *British Journal of Psychology.*

II. Previous Researches. Ebert and Meumann in Germany, Coover and Angell, Scripture and Judd in America, and Winch in England, have, as a result of their experimental work, concluded that some *general* power is developed. The work of Woodworth and Thorndike and the experiments here described, show exactly contrary results.

III. Description of Tests.

A. With School-children.

(i) *General Account.* In three schools, three classes were taken consisting of children of the average age of 11-12. Each class was tested with ten different kinds of memory material and then arranged, upon the basis of the results of these tests, in four groups of equal average ability. One group was practised in memorizing poetry, another tables, another in reproducing the gist of prose passages read to them, and a fourth underwent no training. The practice extended over three weeks (half an hour on each day, four days per week). A second series of tests was then given, and after its completion a further and exactly similar period of practice followed by a third series of tests.

In the case of two schools, a fourth series was given, one month and four months respectively after the conclusion of the third series, and without any further practice.

(ii) *Tests. (a) Immediate Memory.*

1. *Letters.* Consonants were dictated once, from four to eight at a time. The children then wrote down as many as they could remember, in as near the correct order as possible.

2. *Dictation.* Continuous prose was dictated once, from eight to nineteen words at a time. The piece was specially arranged in intelligible sections, beginning with eight and gradually increasing in number to nineteen words.

3. *Names.* Very simple Christian and Surnames were read to the class two, three, or four at a time. The Surname being then given, the children were required to write down the corresponding Christian name.

4. *Geographical places.* A cyclostyled map of the world was placed before each child and a large similar wall-map hung in front of the class. Places were indicated one, two, and three at a time, upon the large map. The latter was then covered, the place-names read out one at a time, in the same order, the children putting marks to indicate the corresponding positions upon their own maps.

(b) Prolonged Memory.

5. *Points in Circles.* Large cards showing circles containing three, four, five or six points were placed before the class. Each child had upon his desk a sheet of squared (chequered) paper, containing a large number of circles of four "squares" radius. Six views (of one second each) of the cardboard circle with its points were allowed, after each of which the children marked upon their own circles the positions of the points.

6. *Nonsense Syllables.* Three sets of eight syllables each were exposed by means of apparatus, five times, the children repeating them aloud in couplets as the syllables appeared behind an aperture. Then the first member of a of a couplet was dictated aud the children wrote the second member.

7. *Dates.* Two sets of six dates each were repeated eight times by the class after the experimenter. The event was then read out, the children writing the corresponding date. The order of the test was different from that of the repetitions, but the same order was preserved throughout all four test series.

8. *Poetry.* A stanza of from six to eight lines was first read through by the experimenter, and then a given number of times, line by line, the children repeating after him. They then wrote what they remembered.

9. *Prose.* With a short and simple classical prose extract a similar modus operandi was used.

10. *Substance of Prose.* The children wrote down what they remembered of a simple relation of facts after it had been read twice to them.

(iii) *New Features.*

1. A cyclic arrangement was adopted by means of which all three test series could be considered equal in difficulty. That is to say :—

School I took the three tests in the order ABC.
,, II ,, ,, ,, BCA, and
,, III ,, ,, ,, CAB.

The average result of the three schools for the first series would therefore be $\frac{ABC}{3}$; for the second $\frac{BCA}{3}$; and for the next $\frac{CAB}{3}$. Unless therefore the practice influenced the power to memorize in some way, favourably or unfavourably, it could reasonably be expected that the results of series two and three would be similar to those of series one. Moreover, the results would represent absolute and not merely relative values.

2. In the practice, every practising group was subjected to the same conditions, two teachers and the experimenter taking groups in rotation for one week.

B. With Students.

(i) *General.* Two classes of women Training College students, of average age 18-19, joined in the experiment. They were tested in six different kinds of material, and then arranged in four groups as before described. Two test series were employed, with an intervening practice period of 12 days (on each day half-an-hour). The use of two classes, and the promise made and strictly kept by the members of the two classes not to reveal anything as to the nature of the tests, gave opportunity for the same kind of cyclic arrangement as in the case of the children.

(ii) *Tests.* (*a*) *Immediate Memory.*

1. *Letters.* This test was handled in exactly the same way as with the children ; but the final number of letters was increased to nine.

(*b*) *Prolonged Memory.*

2. *Nonsense Syllables.* Three sets, this time of 12 syllables each, were repeated a given number of times, and tested as before.

3, 4, 5 and 6. *Dates*, *Prose*, *Poetry and Prose Substance* were similarly treated, the only difference appearing in the length and difficulty of the matter. All the material was however well within the students' comprehension.

IV. Method of Calculating Results.

(i) The number of correct items was in every case made use of. The numbers obtained in the second, third and fourth tests were then compared with those of the first.

(ii) For purposes of comparison, the number of correct items gained by the non-practised children was subtracted from that gained by the practised, and divided by the Standard Deviation.

(iii) The probable error was obtained, and indicates which of the values are significant.

V. Analysis of Results.

It is possible to indicate here only one or two of the most important of these.

A survey of the figures shows the following facts :—

(i) No *general* improvement of practised over unpractised is discoverable. In this point there is remarkable similarity between the results obtained with children and those with the students. The experiment therefore shows that practice does not necessarily develop any general power such as the so-called "faculty of memory" or attention, &c.

(ii) In one case, that of nonsense syllables, a considerable improvement of the trained over the untrained took place, only however with those who practised poetry or tables—media where the element of rhythm was prominent, and in this one important point resembling the nonsense syllables. Those who practised prose substance, where rhythm does not of course appear, made no improvement. Introspections obtained from the students assign very generally the cause of improvement to the presence of rhythm as a common element. It may therefore be inferred that the effects of practice are transferable where common elements exist.

(iii) The practice in prose substance effected an improvement in that subject, but in no other. It had a disastrous effect upon the power of *mechanically* memorising, seen for example in the fact that this group made less improvement in nonsense syllables than that which had no practice at all. We must therefore face the fact that some practice has the effect of diminishing the power to memorise some other material.

REPORTS OF MEETINGS, CONFERENCES, ETC.

Training College Association.

A Meeting of Principals of Training Colleges was held at 19, Great Peter Street, on 20th December, 1910. The following Resolutions were passed:—

1. Date of the Board's Final Examination—

   "This Meeting of Principals suggests that the Board of Education's Final Examination, 1911, should begin on July 3rd, with the exception of the papers on the Principles of Teaching and on the Theory of Music, which should be taken in the preceding week. It further requests that the dates be announced as soon as possible."

2. Physical Training—

   "This Meeting trusts that the Board will adopt, for Physical Training, a method of examination similar to that adopted for the other 'inspected' subjects."

3. Medical Examination—

   (i) "That the present methods of medical examination of candidates for admission to Training Colleges are unsatisfactory, and should be superseded by the examination of all provisionally accepted candidates by the Medical Officer of each College, candidates paying their own travelling expenses."

   (ii) "That, with a view to securing some approach to uniformity of standard as regards the acceptance and rejection on Medical grounds of candidates for admission to Training Colleges, it is desirable that the questions to which answers are required by the Board of Education should be of a more searching and specific character than at present, and that more explicit directions for classification under heads A, B and C should be given."

4. Oxford and Cambridge Senior Local Examinations—

   "That the Pass in English required by the Board of Education (see footnote on p. 49 of the Training College Regulations) for entrance to Training Colleges, in the case of candidates who qualify by means of the Oxford and Cambridge Senior Local Examinations, should (in the opinion of this Meeting) include a Pass in Composition."

5. Conditions of admission to courses preparatory to University Examinations—

   "That the President of the Board of Education be requested to receive a deputation with reference to the footnote (relating to standards of attainment in English and History) on p. 52 of the Training College Regulations."

The Nineteenth Annual General Meeting was held at the Caxton Hall, Westminster, on Wednesday, Dec. 21st, 1910.

MORNING SESSION: Mr. D. Salmon (President) in the chair.

1. The Minutes of the last Annual General Meeting were read by the Secretary and confirmed.

2. The Report and Balance Sheet for 1910 were adopted on the motion of Professor J. A. Green and Mr. W. Loring.

3. The following elections for 1911 were declared:—

Vice-Presidents: Miss L. Manley, Principal of Stockwell College.

Professor J. Adams, Principal of London Day College.

Hon. Sec. and Treasurer: Mr. H. E. Griffiths, St. John's College, Battersea.

The President for 1911 (Mr. W. Loring, Goldsmiths' College) here took the chair.

4. Votes of Thanks were unanimously accorded the outgoing officers on the motion of Mr. J. H. Gettins and Rev. S. Blofeld.

Mr. D. Salmon replied.

An Address was given by Mr. Cyril Jackson (ex-Chairman of the London Education Committee). The principal points of the Address were—the desirability of restricting the work of students in Training Colleges to the special subjects in which they were best qualified to give instruction instead of extending their teaching over the whole curriculum; the need of short courses for rural teachers; the suggested experiment of having Training Colleges for teachers in Infant Schools.

A hearty Vote of Thanks was accorded Mr. Cyril Jackson on the motion of Rev. Preb. E. Hobson and Miss B. Forth.

5. The President then delivered the Presidential Address, for which he was cordially thanked on the motion of Rev. Canon Morley Stevenson and Rev. R. A. Thomas.

President's Address.

THE year which has elapsed since the last Annual Meeting of this Association has been, in one sense, an uneventful year. There has been no new legislation affecting the Training Colleges, and (for the first time, perhaps) the Regulations of the Board of Education have been re-issued without amendment. The Representative Sub-Committee of the Association, established in February (under a Resolution passed at the Annual Meeting) as a means "by which more rapid action can be taken with the authority of, and on behalf of, the Association," was duly appointed in the following month; but in no single case has "rapid action" been required. A Joint Committee of the Training College Association and the Teachers' Training Association, possessing advisory but not executive powers, was appointed at the same time and under the same authority: but its advice has not been needed. If we have not been specially helped this year, we have not been seriously harassed. Our difficulties have been, in the main, the standing difficulties which the Association is beginning to look on almost as old friends. It has been a period of discussions and conferences, no less in the educational than in the political world; and if, in the former, it has been a time rather of preparation than of accomplishment, it has nevertheless, I believe, been far from unprofitable.

I. I must mention first, not because it is necessarily the most important, but because it relates to the Student at the earliest stage at which he is known to us,—or rather, not to the Student at all, but to the aspirant,—the question of the Medical Examination which precedes admission to College. The problem of the Medical Examination has been with us for some time past; and a number of Principals and Medical Officers of London Training Colleges met at intervals during the Spring of this year to consider how it could best be dealt with. To the present system, which has been in force since 1908, and against which this Association has more than once protested, no Training College, so far as I know, is reconciled. The The Day Colleges are least affected; for a somewhat lavish expenditure on candidates' railway and tram fares enables them to adhere, in practice, to the old arrangement by which all candidates were examined by the College Medical Officer. For the Residential Colleges the cost of this would be prohibitive; and, with some two thousand medical practitioners recognized by the Board as qualified to examine candidates, and no very specific directions as to the standard to be observed, it is no wonder if the results obtained are anomalous and unsatisfactory. Even among College Medical Officers there has always been some difference of standard, candidates rejected at one College being not infrequently accepted by the Medical Officer of another; but, so long as the wholly unfit were everywhere rejected, this might be regarded as a comparatively minor evil. At the Conference referred to, proposals were made for dealing with both the greater and the lesser difficulty by *(a)* replacing the examination in the hands of the College Medical Officers, and *(b)* issuing a more detailed form of certificate, accompanied by specific directions as to the kind and degree of physical defect which should entail either rejection or relegation to the "B" (or doubtful) class. The revised form of certificate drawn up by the Conference has been submitted to the Board of Education, with a copy of the following Resolutions:—

(i) "That the present methods of medical examination of candidates for admission to Training Colleges are unsatisfactory, and should be superseded by the examination of all provisionally accepted candidates by the Medical Officer of each College."

(ii) "That, with a view to securing some approach to uniformity of standard as regards the acceptance and rejection on Medical grounds of candidates for admission to Training Colleges, it is desirable that the questions to which answers are required by the Board of Education should be of a more searching and specific character than at present, and that more explicit directions for classification under heads A, B, and C, should be given."

(iii) "That the accompanying draft, being a modification of the Board of Education Form 4 T.C., indicates the views of this Conference on the standard which should be maintained and the questions which should be asked, and the Conference considers it highly desirable that it be adopted by the Board of Education in place of the present Form 4 T.C. and circular 732."

(iv) "That a copy of these resolutions be forwarded to the Board of Education, with an intimation that a deputation from the Conference will gladly wait upon the Board to discuss them in detail if desired."

The discussion with representatives of the Board, suggested in the last resolution, is to take place early in the New Year. The adoption of either of the first two recommendations by the Board would, in the opinion of those who took part in the Conference, secure a far greater uniformity of standard than at present, while the adoption of both would, they believe, be a complete solution of the difficulty.

II. Akin to the question of medical examination is that of the other criteria by which candidates are selected to be trained for the Teaching profession. With one of these criteria—the group of examinations accepted by the Board as evidence of academic attainment —I observe an increasing dissatisfaction on the part of Training College authorities. Pending further experience, my own views on the present arrangement of the Preliminary Examination Certificate list, and on the value of the Oxford and Cambridge Senior Local Examinations as entrance tests, are not sufficiently defined to occupy profitably the time of this Association. On the other hand, of the need of a more thorough sifting of candidates, from the point of view (a) of teaching capacity (rather than attainment), (b) of character, I have no doubt.

(a) Capacity as a Teacher can be judged from the Pupil-Teacher (or Student-Teacher) Record-book, provided that the candidate has been a Pupil-Teacher or a Student-Teacher, and that the record has been consistently and judicially kept,—conditions which are not invariably fulfilled. I sincerely trust that the Association will adhere to the position taken up by them last year, viz., that practical experience of teaching should in all cases precede admission to College; for thus only can we avoid those numerous "misfits" which are so prejudicial both to the individuals concerned, and to the profession. I trust also that *all* Local Education Authorities will insist on a regular and careful record being kept throughout the period of practical experience, and on its being made available to Training College authorities responsible for the selection of Students. At the same time considerable latitude should, in my opinion, be allowed to Training College authorities as to the *kind* of teaching experience which they are prepared to accept. The Board of Education at present impose what appears to some of us to be an unnecessarily, and even harmfully, rigid rule requiring extra "School Practice," during the period of College Training, in the case of Students who, though the College authorities are satisfied as to their professional capacity, have failed to fulfil certain technical requirements before admission.

(b) Of the moral and personal fitness of a candidate there are two criteria, and only two—for to mere testimonials (whether from the Head Master of his School or otherwise) no very great value can be attached. These two criteria are (1) the direct, and confidential, report of the Head Master or Head Mistress of the Secondary School or Centre to the Principal of the Training College, (2) personal interview. Both are important, but the former is (as I feel more strongly year by year) by far the more important of the two. As regards the relative merits of candidates *from the same School*, the judgment of the Head Master or Head Mistress (so far as it relates to matters within his, or her, cognizance, *i.e.*, not teaching power, but character and personality) can be relied on. It should be invariably sought, and the opportunity of giving it is generally regarded as a privilege. Personal interview is necessary partly as an indication of the best and worst,—the candidate who should be accepted even if his attainments are mediocre, and the candidate who should be refused at any price,—and partly as a criterion between School and School. The Regulations of the Board which have made the interviewing of candidates more difficult than formerly are undoubtedly retrograde. But this is no new grievance; it is one of our "old friends;" and, strongly as I feel about it, and glad as I am of the opportunity of once more inviting attention to it, I do not propose to deal with it in detail.

While urging the necessity of a careful sifting, and better opportunities for the sifting, of candidates, I should be sorry to be understood as dissatisfied, *on the whole*, with the type of man and woman which at present passes through our hands. A large minority are excellent material; a much smaller minority are "undesirables," whom every friend of teachers wishes to exclude; others again are (in character and personality) by no means "undesirables," but cannot learn to teach,—these also should be eliminated at an earlier stage in their career. Again, we need not the good candidates merely, but the best; and no efforts to attain this end can be excessive. But the average Student has many good qualities. He is remarkably free from all gross vice. He is temperate; fairly—many of the women are very—industrious; he is amenable to discipline,—nay, somewhat too expectant of, and dependent on, discipline; not difficult to deal with, either individually or in the mass; generally loyal and considerate towards his fellows; modest, yet frank on occasion, with his superiors. He is somewhat ill-informed, but by no means stupid; and he takes life seriously, without (as a rule) lacking humour. This is the *average* Student, not the best or worst; and the range is a wide one. Now, good on the whole as the average is, we must endeavour to raise it, and to exclude altogether those who at present fall below it. One cannot be too jealous for a high standard of character and personality on the part of those whom one trains for the Teaching profession. And, the Student once admitted to College, his sense of honour, and in particular the sense of the obligation ("though it were to his own hindrance") incurred by him in the acceptance of a training at the public expense, needs cultivating by all the means in our power.

III. We are all, no doubt, watching with interest the attempt of the Board of Education to introduce, throughout the Colleges, not merely a uniform system, but a uniform syllabus, of Physical Training. Uniformity of syllabus is not an educational ideal. In Physical Training, as in all other subjects with which we have to deal, initiative and experience, within reasonable limits, are the conditions of progress. But it is necessary sometimes to pause and make good the ground already gained, especially when forces are scattered, confused, and perhaps in some cases demoralized, by conflicting or even self-contradictory orders. Viewed in this light, the action of the Board appears to be justified; and we shall not, I venture to think, complain of a certain rigidity in the directions given to us during the next two or three years if they are only *consistent*. But I doubt whether any of us are satisfied with the present (doubtless temporary) method of examination, viz,, individual examination of every Student by the Board's Inspector. It is not fair to judge once for all on the result of ten minutes' observation by a stranger; and the injustice is greatly increased if the examiner intervenes, during those ten minutes, by comment and suggestion, however kindly meant. That the period of rigid uniformity may be short is very much to be wished. It seems very desirable also that, even during this transition period, the Board's share in the examination should be the same as in the case of all the other "inspected" subjects, viz., a test of the College Instructor's assessment by means of samples. If, on the other hand, it be thought necessary to adhere to the method of individual examination for a time, the final mark should (in my opinion) be compounded of that given by the Board's Inspector and that based on the more intimate knowledge of the Student's attainments possessed by the Instructor. A Resolution advocating the test by sample has been passed by a Meeting of Principals, and will be communicated to the Board.

IV. The subject of this afternoon's papers and discussion ("The overloaded Curriculum, and how to lighten it") is no new one; but an increasing amount of attention has been concentrated on it of late. It is "in the air"; and it is understood to have been the subject of conference both at the meetings of a recently-founded Branch of our own Association, and in more official quarters. We all, I am sure, look forward to the statements by Professor

Adams, Mr. Reed, and Miss Brown-Smith of the views which they hold upon this important—nay, fundamental—problem. And we shall be especially grateful for the indications (if any) which they may feel themselves at liberty to give us of the results provisionally attained at the meetings and conferences above referred to. To focus the results arrived at in meetings of a more local character would seem to be an important—perhaps the most important—function of the Annual Meeting. The local Conference, the Branch Association, are in many ways by far the more effective; and the Association is, I consider, to be congratulated on its recognition of that fact, and on the encouragement which it has given to the formation of Branches and Sections. At the same time these smaller groups have everything to gain, and nothing to lose, by the ventilation of their conclusions in the larger atmosphere of the General Meeting, where they can be considered not in relation to a single locality, or a particular group of Colleges, but to the Country and the Colleges generally.

It would ill become me, in this Address, to forestall this afternoon's discussion by a detailed exposition of my own views upon the problem with which it will deal. But as this is, after all, amongst the most fundamental of all problems which can arise in connexion with our work, and as we are this year mercifully relieved from the pressure of the far less interesting administrative problems which so often engross our attention, I cannot forbear to record (1) the strong impression, derived from my relatively short experience of Training College work, that the Two-Year curriculum *is* greatly overloaded—not indeed in respect of the amount of work required of Students, but in the number of different subjects included in it,—a number so excessive as (in my opinion) to militate against all concentration, all thoroughness, all high ideals; (2) my conviction that, even if it be impracticable (which I venture to doubt) to arrange for *some* degree of specialization on the part of the Teaching Staff in all Schools of a reasonable size—without prejudice to the maintenance of the Class system for general purposes,—it would still be worth while, in the interest of the Students' intellectual development, and therefore of their ultimate efficiency as Teachers, to allow a greater degree of specialization, and consequently a narrower range of work for each individual, in the Training Colleges.

It is one of my duties to countersign annually some 250 "College certificates," in which the course followed by each Student is detailed at length, and the proficiency attained by him, or her, in each subject composing it is specified. The number of subjects in which a Student is "signed up" (including both academic and professional subjects) is seldom less than 14, and not infrequently 15. The mere statement of this fact appears to me to be a "*reductio ad absurdum*" of the present system. Without asserting that the absurdity has been avoidable in the past (for the curriculum has doubtless been framed with reference to the material with which the Colleges have had to deal), I believe the time has come when the system may be, and ought to be, modified. And, without suggesting that any of the subjects generally included in the course are unnecessary to an Elementary Teacher, I venture to think that, so far as academic studies are concerned, we should in future aim rather more at cultivating his intellect, and rather less at providing him with a complete instructional equipment; just as in that part of education which relates to the conduct of life, the wise parent or teacher relies rather on the training of character than on the details of a comprehensive moral code.

V. I should regard it as an important educational advance, and a step in the direction of that reform of the curriculum which most of us desire, if a larger number of Training College authorities would make arrangements for Examinations under Art. 23 (a) or 23 (b) of the Board of Education's Regulations in place of the Final Examination conducted by the Board. Such "alternative" Examinations (to use the technical term) give scope to the wholly laudable, and I think increasing, desire of Teachers for a preponderant share in the examination of their Students, *and for the liberty in teaching which is gained thereby*. Of the Articles referred to, Art. 23 (a) is that under which the Board of Education most completely divest themselves of direct responsibility for the testing of the Students' attainments in academic subjects, the Examination taken under this Article being one "conducted by a University, but not constituting a recognized stage in the course for a Degree." This is the kind of Examination which has been provided at my own College since its opening in 1905; I am therefore in a position to speak of its results from personal experience; and, as an ounce of experience is worth a pound of theory, I venture to think that mine may be of use to other Colleges. We are exempted from no subject of the Two-Year course, hence "overloading" is felt with us as much as elsewhere. But the distribution of the work under the various heads, the choice of books, periods, &c., the syllabuses, and the relative weight assigned to subjects in assessing the final result, are in our hands or in those of the University; and I am often in the happy position of being completely out of touch with the minor grievances arising from the Board's Regulations of which so many Training College Principals complain.

The system, no doubt, has its drawbacks. It is somewhat costly (more than £1 per Student for the two parts of the Examination combined), and the extra work and responsibility thrown upon the College Staff, who act as "Internal" Examiners, is a serious burden; but the freedom in arranging the courses of study, and the opportunity of experimenting, and profiting by the results of experiment—in short, the educational elasticity,—gained are felt, I think I may say universally, both by the College Staff and by our Governing

Body (a Delegacy of the University Senate) to be out of all proportion to the expense and inconvenience entailed.

The expense, due mainly to the fees of the "External" Examiners, appointed by the University, can probably be reduced to some extent by the federation of two or more Colleges for examination by a single University; and it is perhaps not unreasonable to suggest that, if a substantial number of Colleges adopted the system, the Board of Education might see their way to make a special grant equivalent to the saving effected by restricting the scope of their own Examination.

VI. That the liberty of experiment, gained by the system referred to, would be a powerful factor in the reform of the curriculum, there can be, I think, no doubt. That these reforms will be, so far as the academic subjects are concerned, in the direction indicated above, (Section IV) appears to me extremely probable. And at this point I feel that the question may arise whether the "Examination conducted by a University" which I advocate, following on the more concentrated course of study which I also advocate, should not be a Degree Examination; whether, in fact, it is possible to combine an academic curriculum, having culture as its main objective, with professional training, in anything less than a complete University course.

In the full sense of the words, probably not. But I would ask another question. Is it possible, in a course extended to three years, for the *average* Student in a Two-Year College to obtain his Degree without prejudice to his professional work? Notoriously it is not so. It is only the few who, under the present strict requirements of the Board of Education, are permitted to prepare for the Degree; and how large a proportion even of these few fail to obtain it! The days may come when an enlightened public opinion may favour, and may be willing to defray the cost of, a Three-Year course in every case, and when so high a standard of attainment may be generally reached, before entrance into College, that the *average* Student may safely be allowed to divide his time during those three years between professional training and preparation for a University Degree. At present neither of these conditions is fulfilled; and in the meanwhile, with every desire that reasonable opportunity should be given to well-qualified Students to obtain the coveted distinction, and with all respect for the views of those (and they are many) who advocate a relaxation of the Board's restrictive regulations, I feel bound to record a contrary opinion. So far, at any rate, as the regulations apply to preparation for the Final Examination, they appear to me to be none too strict. In the interest both of Teachers and of taught, it is surely most undesirable to increase the number of members of the profession whose sole claim to culture is that, like the Indian babu, they "Failed B.A.," or of those who are able to write "B.A." after their names without the qualifying participle, but have attained this distinction at the cost of professional efficiency.

VII. I cannot altogether pass over the question of unemployment, which has occupied so much attention of late; but my remarks upon the subject shall be brief. The excess in the supply of newly-trained Teachers over the demand, which first became somewhat serious in 1908, reached its height last year, and there are some indications that it is already on the wane. Its effects have been both good and evil. Good in so far as it introduced for the first time in the Teaching profession what is found to be a vivifying principle in other walks of life, viz., the principle of competition, not merely for the prizes of one's profession, but even for the privilege of obtaining a secure footing in it. There is no doubt that some aspirants, who could never have become anything but very indifferent Teachers, have been driven by it to take up work better suited to their capacity, to the great advantage of the Teaching service. Bad in two ways; *first*, because the change, coming suddenly, has caused very real hardship to a number of deserving parents who, judging by past experience and by official forecasts, had every right to expect that the "pinch" which was inevitable during the years of their sons' or daughters' training, would be followed by a time in which those sons and daughters would at least be self-supporting. Many of these young people, on leaving the Training College, have become temporarily more dependent upon their parents than ever, owing to the want of employment and the termination of the Government grant. Bad, *secondly*, because the swing of the pendulum, to some extent inevitable, bids fair to be unnecessarily violent; it is becoming evident that the glut of Teachers will be followed by a dearth of Teachers; and the date at which equilibrium will be attained has been appreciably postponed.

We cannot but sympathize with our ex-Students, who feel that they have been to some extent misled, and unnecessarily misled. But there is, I think, no fear that their troubles will be of long duration; and it appears to me important, from the point of view of the public service, that we should not create, by exaggerated protest or condolence, a falsely unfavourable idea of the prospects of a profession which will shortly be in need of every qualified recruit.

AFTERNOON SESSION: 1. Papers on "The Overcrowded Curriculum and how to lighten it" were read by Professor J. Adams, Mr. A. W. Reed, and Miss H. Brown Smith.

Professor Adams said:—

THE subjects hitherto included in the Training College curriculum fall naturally into three classes. First we have the ordinary subjects that are taught in all Secondary Schools for their culture value and for their utility, such subjects as Mathematics, Science, Languages, and History. For convenience we shall call these academic subjects.

Then we have such purely professional subjects as School Management, School Hygiene, Theory and History of Education, and the methods of teaching the various school subjects. Between these two great divisions comes an intermediate group, including what may be called the semi-professional subjects—Drawing, Music, Phonetics, Drill, Voice-production, and Needlework. Obviously these subjects might be quite reasonably included under the academic class, since they are now taught more or less thoroughly in many Secondary Schools. Hitherto, however, the semi-professional subjects have received much more attention in Elementary Schools than in Secondary, so that students who came from Secondary Schools had to receive instruction in them almost from the rudiments. Yet these subjects are essential in all Elementary Schools, and it is therefore reasonable to insist that they should form an essential part in the professional preparation of teachers who are to teach in those schools.

The main cause of the congestion of the Training College curriculum in the past has been that all three classes of subjects have had to be taken by each student. The most natural way of simplifying the Training College course would be to eliminate all the academic subjects. The real business of the Training College may be said to be to train its students in the art of teaching, not to supply the knowledge that they are to communicate to their pupils. In the training of secondary teachers the orthodox ideal is that the work of the Training College should begin where the University Arts or Science course ends; that is, that training should be post-graduate. The same ideal may be applied to the training of elementary teachers if we regard the academic work of candidates in the Secondary Schools as corresponding to the degree course of the secondary teachers. In view of the better arrangements that now maintain in the preparation of student teachers, may it not be hoped that they will come forward to the Training College with such a grounding in the academic subjects as will enable the Colleges to act upon the post-graduate ideal, and confine their work to the professional subjects and such of the semi-professional subjects as may be found necessary?

It may naturally be suggested that the leaving certificate of even the best Secondary School does not guarantee a sufficiently high standard of attainment for a person who is to be a certificated teacher. The answer to this criticism may take three different lines.

(1) It has to be admitted that in the past the academic work done at the Colleges did not go beyond that done at a good Secondary School. Therefore it is unfair to say that the proposed elimination will result in a lowering of the academic attainments of the students in training.

(2) It is true that the teacher who has had experience of both a Secondary School and a Training College will at once enter

the caveat, that while the secondary pupil and the student know the same facts, they know them in a different way. The greater maturity of the student enables him to organize his knowledge, after a fashion that is impossible to a younger person of equal mental capacity. This has to be admitted, but does not militate against the proposed scheme. In the Training College course it will always be necessary to deal with the subject matter of the academic group, because this is the material on which the professional training of the students must be conducted. In the past it has been generally recognized that the Training College teachers of the academic subjects should themselves be specially capable teachers of those subjects, and that part of their work was to train the students how to teach those subjects. They were expected to teach always with a view to the way in which their students would afterwards teach what was learnt at College. Under the proposed simplification this double function would be still recognized, though now the incidence would be upon the method, just as before it was upon the subject-matter. Whereas, formerly, the student's method of teaching history was improved by observing the tutor's method and explanations, now the student will improve his knowledge of history by having its subject-matter used as the material with which method is illustrated.

(3) All the same, the experienced Training College teacher will feel that there is a certain danger of thinness in his work, if no actual instruction is given in College. For the good of the student, too, it is well that there should be no danger that he should form the notion that he "knows" all the subjects he has dealt with in his Secondary School course. There ought, therefore, to be room in the Training College curriculum for a certain, but rather limited, amount of specialization, both for the good of the students, and for the advantage of the schools in which they are to teach; for even in Elementary Schools there is an important, if restricted, scope for specialization. It is highly desirable that the more capable students should be encouraged to take up one, or, at most, two, academic subjects, and learn from a careful study of the subject selected what really thorough work means. If this plan is adopted, the students will have an idea as to the kind of work that is necessary for the mastery of a subject; they will recognize their limitations in the subjects in which they have not specialized, and will thus get rid of one of the most common reproaches cast at the elementary teacher.

With regard to the subjects to be taken up by student teachers at the Secondary Schools, it must be confessed that it is very difficult to have modifications made to suit the needs of those who are to come to the Training Colleges. They must fit into the ordinary course provided at the school. No doubt there is a certain force in the contention that student teachers should go through exactly the same mill as their fellows at a Secondary School. But wherever alternatives are permitted, we must do what we can to see that student teachers take the subjects that are of most value for their future work. A pupil who is to become an elementary teacher will naturally prefer the modern to the classical side, will choose geography rather than French, modern history rather than ancient, object drawing rather than the drawing of classical ornament. With regard to the choice of academic subjects there is a principle that is enforcing its importance very strikingly on all who are engaged in the practical training of young teachers—the principle that students must study specially those subjects that they are afterwards to teach. Once those subjects have been mastered in sufficient detail for all practical purposes, it is highly desirable that students should pass on to other subjects outside of the Elementary School curriculum. A student is all the better of knowing Latin or French (or for that matter Latin *and* French), if in the first instance he has a satisfactory knowledge of all the subjects he has to teach. It may or may not be true that a man who knows only his own language is a half educated man, but it is certain that learning French will not help a man to teach music, or a girl to teach needlework. No doubt, to use a most dangerous phrase, "it is a pity" that we have to cut out subjects that are of great culture value; but while there is any danger that the ordinary Elementary School subjects will be neglected there is no room for any others.

It is with regard to the semi-professional subjects that most trouble is likely to arise. For example, neither in boys' nor in girls' Secondary Schools is music much taught as a class subject. Whatever pressure can be brought to improve this state of affairs will be of advantage not only to student teachers, but also to the ordinary pupils at Secondary Schools. In every Secondary School where drawing is taught it should be made a compulsory subject for every student teacher in attendance. Needlework is a source of great trouble in the Training College curriculum. The subject is not sufficiently attended to in the Secondary Schools, with the result that the new class of candidate is coming up less well qualified than the old. Needlework demands so much time in the Training College, when it has not been properly taught at school, that something must be done to get candidates better prepared. The student teacher year, during which candidates are supposed to "browse," seems to me specially well suited for this subject. Every girl student teacher who is not fully qualified in needlework should be required to take up this subject as part of her work during her visits to her Secondary School. No subject lends itself better to the conditions under which student teachers do their academic work. The Training Colleges can do a great deal to favour the proper attention to the semi-professional subjects in schools if they let it be known that they give a preference to those who come up well prepared in them. A further and very effective lever is to restrict the advanced subjects to those students who come up with a clean sheet in respect of the semi-professional subjects. If a girl knows that, however anxious she may be to go on with her French at College, she will not be permitted to take up that subject so long as she has to spend the time necessary to master the needlework syllabus, she will see to her needlework at the proper time. No one who is in the least acquainted with what has to be done in the mere training of how to teach needlework will for a moment make the suggestion that in insisting on preparation in the art itself the Training College authorities are making their work easy—they are only seeking to make it possible.

We must not confound an elaborate list of subjects with an overcrowded curriculum. The more adequate the staff of the Training College the greater the number of subjects that may be offered for selection. If too many subjects are offered as a choice there may be waste of time and money, but there is not necessarily an overcrowded curriculum for the individual student. The Colleges must claim and exercise greater freedom in determining the course of individual students. What would be an overcrowded curriculum for one student would be quite a reasonable course for another who is of a different capacity and training. It may be necessary to retain all the present subjects in the College curriculum in order that certain students may be able to make up deficiencies in their academic or semi-professional subjects, but the curriculum cannot be said to be overloaded so long as it is so arranged that no individual student is bound to take more subjects than he can profiably manage. The cutting out of subjects, however, should take place at the upper, not the lower, end.

It may be objected that the student's personal culture will suffer if he is not permitted to take up subjects that lie outside the Elementary School curriculum. But in the first place this limitation will apply only to those who come up badly prepared in the Elementary School subjects, and in the second it has to be remembered that it is no longer admitted that there is no culture value in the more or less advanced study of English, of History, of Geography. With no other subjects than those dealt with in the Elementary School the student may attain a high degree of culture, though it must be cordially admitted that wherever possible his attainments should be supplemented by one or two branches of knowledge outside this range.

Our policy may be thus summarized: (1) Let us do all we can to secure compliance with our demand, that our candidates shall come up adequately prepared in the academic subjects and (so far as this is possible without unreasonable demands on the Secondary Schools) the semi-professional subjects. (2) Devote all the time that is necessary to consolidate these subjects while training our students in the art of teaching them. (3) Let whatever time is left over be spent in allowing students to specialize: (*a*) in the case of average students the subjects should be confined to those taught in elementary schools; (*b*) in the case of the better students, subjects outside this limit should be allowed.

MR. A. W. REED (Chairman of the London Branch of the Training College Association) said: I beg to submit that, so far from being overloaded, the Training College curriculum is on the contrary not so heavy as it might be. Our young people ought to know at least as much as is implied in the curriculum, and be put into the way of learning a good deal more.

I sometimes think that we are living in a soft age, under perennial showers of soft theories, and that we are so much afraid of working on wrong lines that many of us do not do any work worth mentioning at all.

What I do complain of is, not that the curriculum is overloaded, but that the whole fardel of little bundles has to be carried right into the second or third term of the Second Year before the students can deliver any of them. Of course, the unscrupulous porter sheds his packages as he goes, keeping an eye on a mark of merit, the tip for the successful delivery of his fattest bundles.

Now the obvious solution to this problem is to have a First Year Examination, and so effect a partial clearance.

But lest you should think that I consider the Board's curriculum an ideal one, let me say boldly that I do not think that the Board can produce a very good curriculum. Having produced, as the result of a great upheaval, a better curriculum than it has produced before, the Board rests for a long time so far as curricula are concerned. If we were permanent officials, with a number of things besides curricula to think about, you and I would do the same.

But whether their curricula are good or bad, I really cannot imagine why the Board should be an examining body. The great examining bodies that we all know have at least the following characteristics; they have unquestionable credentials, they elect their examiners with a wise discretion, they replace them before they have exhausted their fertility, they serve, not control, the institutions they examine, and they are subject to effective criticism.

Now, in all kindness and respect, I ask you which of these features the Board of Education possesses or can possess?

If, then, the best curricula cannot be progressively produced by the Board, and if it is not a proper examining body, we ought to have suggestions to offer, and this Association ought to have views on the matter.

Might I suggest that it would tend greatly to clearer views if we had printed in full in the *Record* the syllabuses of all the Training Colleges at present examined by bodies other than the Board, and that there should be shown also in each case how overcrowding is met by preliminary clearing examinations.

Again, all those Colleges at present examined by the Board should begin to organize themselves in groups under Universities, and with whatever assistance the Association can give them, they should prosecute their plea to the Board for the recognition of the groups. That would of course be a slow matter, but I imagine that the London Colleges might well make a start.

If all went well we should find it the exception rather than the rule for a College to be examined by the Board, whose attention would then be more fitly occupied in supervising, controlling and standardizing the proposals and the examination papers of the groups. You would then, and not until then, have the conditions under which alone a good curriculum can be evolved. It would come by a free and independent growth, a continuous, not a spasmodic growth, and it would be a Training College curriculum, not a curriculum thought to be suitable for Training Colleges.

But at present, you will say, most of us are under the Board. Can nothing be done to ease the present overcrowding that is felt so severely in the second and third terms of the Second Year?

I have already said that that difficulty might be met by a clearing examination at the end of the First Year. I expect to find grave objection taken to the phrase "clearing examination." I find it a good phrase to tease faddists with.

That examination should include Mathematics, and perhaps History, Theory of Music, Hygiene, and some definite subsidiary part of the syllabus of the Theory of Teaching. I agree that exception might reasonably be taken to the inclusion of History in a list of subjects that can be cleared off; but as the Board already permits it, I see a reason for retaining it. The Board also permits Mathematics to be cleared off in the First Year.

My suggestion therefore is that the Board should be asked by the Association to hold a compulsory examination at the end of the Frst Year, in the subjects I have mentioned, so that the students might be more free in their Second Year.

And really this freedom in the Second Year is of very great importance. At present, questions connected with his professional training are, to the Second Year student, intrusions; he has too many other things on his mind, things that have to await the test of the Board's examination.

Again, it is really unfair to allow a man to read Optional English, for instance, unless he is in a fairly comfortable state of nerves.

Of course there are many points that will occur to every one who thinks out this idea of a First Year examination, and I forsee criticism. For instance, what are you to do with people who fail in their First Year examination. I think it is time we had some failures. Perhaps the Board would allow us to present some of them a second time in Mathematics and the Theory of Music, but surely the hopeless cases should not receive, as at present, a general certificate covering their shortcomings.

But, you will answer, the student will have to teach his weakest subject. True, but he will not teach it better with the covering certificate he now gets, than if he failed. Besides, having failed, he might be required by the Board to show at least an elementary knowledge of the subject before he was recognized as a teacher.

These, and many similar small points, will occur to every one, but, if you are convinced, as I am, of the unhealthy effect of the present arrangement of the curriculum, you may find that the expedient of a First Year examination will meet the case temporarily.

I hope that the Association will take the matter up and do its best to persuade the Board of the desirability of a change. But its chief duty in this matter, as it appears to me, is to assist the Colleges to work out some such arrangements of groups as I have suggested, and I venture to offer the opinion that those Colleges which remain under the Board will steadily be left behind by those which are under an independent authority, because the fact of being under the Board deprives a College of half of its legitimate activity—the power and privilege of controlling the development of its own curriculum.

Miss BROWN-SMITH, of the Goldsmith's College, speaking with special reference to Infant School Teachers, said:—

At best, I think, our attempts to lighten the curriculum can only be compromise, because, as a matter of fact, most of us do not really wish to cut down the equipment of a teacher, though we might be glad to do away with certain parts of it, and substitute others. We do not, *e.g.*, wish our students to know less literature or history, or to do less professional work—for a teacher's background cannot be too rich ; at the same time it may be overloaded, and much of it is consequently mere lumber. The obvious cure would be another year of education preparatory to College life. I say all this only to emphasize the fact that my paper is based on compromise, an attempt to make the best of things with the time and stuff given to us.

Before going straight to the main question, and at the risk of appearing to go off the point, I should like to clear up four rather hazy points with regard to Infant Teachers :—

(1) There has been, and may probably still exist to some extent, a curious fallacy, that it is quite economically sound to select an inferior type of person for Infant School work.

According to this theory, an inferior type of person is perfectly fit to deal with children at the most susceptible time of their lives, when everything is in its beginnings, and impressions are most lasting, when fundamental ideas are being built up and when the elements of knowledge are being dealt with.

Professor Dewey says, in his article on the Child and the Curriculum, "The entire science of Physics is none too much to interpret adequately to us what is involved in some simple demand of the child for explanation of some causal change that has attracted his attention. The art of Raphael or of Corot is none too much to enable us to value the impulses stirring in the child when he draws or daubs." And only one whose knowledge is sure will recognize some of the early manifestations of a desire to know or to express, and relate them to the child's attempt to interpret life. The "motherly woman," whose other qualities, except a good character, were negligible, is not the person to deal with delicate and susceptible organisms, though I admit motherliness is a necessity ; but if real work is to be done in the schools, a person of sound intelligence is needed. I think the theory is not only unsound, but pernicious and fatal to progress. It is a fair analogy to say that the persons who believe it should also consistently believe that an inferior type of doctor might be responsible for the health and disease of young children. At the same time that I maintain that an inferior type of person should *not* be allowed to teach young children, I admit that very often the successful Infant Teacher is not always of the same type temperamentally as the teacher of older children.

(2) The second point is the limit of the Infant Teachers' work. It is generally recognized that they teach children up to the age of 6½ or 7 at most. This means that children pass into a new atmosphere at an age when they are in a sense in the middle of beginnings. There is a very difficult transitional period up to about 8, which is best helped by someone who knows what has gone before. This means that it should be generally recognized that the work of an Infant Teacher should include what is technically known as St. II., and the term should be rather Infant and Junior School Teacher, or simply the latter.

(3) The third point is related to a rather generally accepted habit of regarding the bulk of the training of Infant School Teachers as something that can be thrown in with the training of teachers of older children. I am aware this is not universal, but it varies greatly in degree, and in the consideration of syllabuses for these mixed classes in the Training College, the consideration is almost invariably given to the teachers of older children. I shall demonstrate this later in what I say on the curriculum. Much ought to be the same I admit, and it is good and right that the unity of principle should be preserved, but there is a distinct divergence in needs, and this is not by any means universally recognized ; .e.g, in the subject of Arithmetic, compare the time given to the consideration of the Science of Number with the time given to methods of "doing sums." As a kind of peaceable compromise, a fairly common custom is to engage an outside teacher to give a course on some obsolete subject, such as Gifts and Occupations, and to feel that things are quite satisfactory if students are seen manipulating bricks and folding squares of paper, or singing nursery rhymes. This is simply giving them a few external tricks, not training them. As far as I can discover in the

History of Education in England, Training Colleges were first established for Infant Teachers, and only when information swamped the educational ideal did they take in teachers of another sort.

(4) The fourth point is, that for the welfare of her class, it is not desirable that the Infant School Teacher should be a specialist, except when she cannot help it, as, for example, in the case of singing. It is better that she should link work together, not with the verbal crudeness of correlation schemes, but with real intuition and appreciation of the links of knowledge.

I propose to consider the subject of lightening the curriculum on the principle that, by concentrating on certain points much more necessary for the Infant Teacher from the professional standpoint, certain other parts should be treated in a much more general way. This can be done on both the professional and academic side. What I am now going to treat are the topics for special consideration in the different subjects. Assuming, for the moment, that the audience will grant these four points, namely, the equal calibre of the Infant School Teacher, the enlarged scope of her work, the need for more specialization in her training, and for less specialization in her work in school, I will go quite definitely to the consideration of the curriculum. On the professional side, we may admit the following subjects to be necessary :—General Principles of Education, General and Special Method, History of Education, Practice of Education, and Physiology and Hygiene ; as well as those special equipments, which must be termed professional, because they are acquired for professional rather than for personal purposes, namely, Singing, Handwork, including Illustrative work, Drill and Dancing, Voice Production and Phonetics. On the academic side, the subjects generally admitted are History, Geography, Literature, Mathematics, and Science.

In most colleges the time is unequally distributed, and, as a rule, not more than one-third of the two years is given to professional work. Now here comes the first divergence in the case of Infant Teaching. If anything, the preponderance of time should be given to professional work, because so much of the important work lies in the direction of guiding the signs of growth and development, preparing the soil, so to speak, rather than dealing with later processes. It is on this side that the personality of an Infant Teacher needs so much careful training : she must be a personality, she must have vision and insight sufficient to let her see the possibilities of her work, and to realize her own responsibilities. It is not a few knacks and tricks and songs and handicrafts that go to do that ; on the other hand, these tricks often obscure her real work, and blind those who ought to know better to significant signs. If this has to take the place of some of the academic work, which, in the present state of things, seems inevitable, I cannot see that it makes less for culture—the study of human nature in its elements and in its possibilities is surely as likely to give mental training and stimulus as the study of History.

To come to details. I think certain topics in General Theory of Education should be more carefully and thoroughly dealt with by Infant School Teachers. Such are the theory and scope of play, its bearing on early education, instincts, conditions of the development of the sense organs, and their relation to the brain, what observation really means, what expression means, imitation, suggestion, curiosity, effect on mental development of motor activity, and so on. Now should follow the remainder of the syllabus, but studied with less detail.

Physiology and Hygiene should be treated on the same plan, with special reference to details of growth and development, such as times of second dentition, nature of a young child's bones and muscles, &c.

In general and special method, both Infant Teachers and Senior Teachers should know the main outlines of each other's work, else neither can work intelligently. It would, of course, be ideal if each could do both courses of special method—and indeed it has been suggested that under existing conditions students could be prepared for either school—but only those who have to do the work know that this is impossible, unless a smattering of each is given. The general outlines granted then, each group of students must specialize on her own method. Again, it is possible that a short general course in History of Education could be given to Senior and Infant Teachers in common, but the growth of the movement of Infant Schools in Great Britain, and the almost parallel movement in Germany and Swizerland, and their assimilation—with the gradual organization by Boards and Education Councils—should be specially studied by the latter.

That the practice should be special, needs no comment, for this is recognized and provided for, but there should be much more of it.

With regard to what I called special equipments, Singing and Voice Production should dwell on early voice training, and the latter subject should include Phonetics, especially in view of the phonetic system of the teaching of reading, which becomes actually harmful without a background of Phonetics. Drill and games should have young children in view, and handwork should be treated both as a subject and a method. So much for professional differentiation.

On the academic side, an attempt has been made by a sub-committee of the London Branch of this Association to put down what must at least be included in the curriculum of an Infant Teacher. The selection is on the principle that a teacher ought to know well that part of the subject which he teaches—but I should like to make it quite clear that *only* this nucleus is put down in the statement I am about to read—and that the remainder of the syllabus in each subject is in the hands of a group of specialists who profess that subject; e.g., in addition to the literature necessary for an Infant Teacher's work, should come a suitable selection for culture purposes, and the same in every other subject.

The following groups are examples:—

History.

Primitive Man: Paleothic, Neolithic, and Celtic. Roman occupation. Saxon and Norman periods. (Treated mainly from the concrete and social point of view. Alternative Course:—Outline of Ancient Civilization together with some detailed study of one Civilization.

Literature.

Origins of Literature: Myths, Greek and Norse. Fairy Tales, popular and literature. Ballads. Arthurian story (Malory and Spenser).

Arithmetic.

It will be assumed that students have a working knowledge of the four simple rules, fractions, decimals, and proportion. The following to be studied:— Place of Arithmetic in the curriculum; why Arithmetic is taught; its relation to the other subjects; use of concrete material and employment of children's activity in teaching of Arithmetic. Application of inductive processes, memory work, how children arrive at ideas of number; counting and measuring, qualitative and quantitative units; notations; various methods of first four rules; their relation to each other; ditto of fractions and decimals; rough estimates; metric system; use and gradual introduction of algebraical symbols.

Geometry.

A knowledge of the principal properties of angles, parallel lines, triangles, parallelograms, polygons and circles: and of the simpler solids, including the cube parallelopiped, prism, cylinder, pyramid and cone.

The treatment should be chiefly experimental and practical, including construction in paper, cardboard, and other suitable material. The questions proposed may also involve numerical calculations, and easy applications to practical problems of every-day life.

A good deal more must be added to this, but the selection made should be included.

It is a matter of doubt to many whether this is necessary if a good general course is taken, e.g., if a student has gone through a course in Literature should she not be able to deal with a Greek Myth? Or in History, such as is suggested in the Board of Education Courses, could she not treat intelligently the history of the growth of civilization? If she can do advanced Mathematics, should she not be able to deal with the relations of number? As a matter of a good many years of experience I find this is *not* the case; a student may be deeply moved by Browning and Wordsworth and Carlyle, and yet spoil a myth. She may be well read in Constitutional History, and yet be unable to separate proof from deduction in dealing with primitive man. She may cope well with Mathematical problems, and know nothing of qualitative and quantitative aspects of number, or its continuous and divisional side. Of course, if this is added to an already overfull academic curriculum, it will hardly gain its end, but I venture to think that a good deal of what is now taken might be omitted with this principle in view. If students learn how to interpret and how to read a subject, surely they might be left to cover some ground alone.

Another alternative, but one which I do not strongly recommend, is that this part of the curriculum be left as illustrative matter for special method, but this has two objections: (1) that much more time would be required for method, and (2) that the knowledge of the lecturer in method would have to be encyclopædic.

I am afraid that I do not appear to have done much to lighten the curriculum, but indirectly I have attempted to do so by showing what is at least necessary, and that I do not think has been done previously for Infant Teachers. I am aware of Syllabus V of the Theory of Teaching Section in the Board of Education's Suggestions for Training of Teachers, but I think it has grave omissions, e.g., two of the most important topics, the theory of play and handwork are omitted.

On the academic side, no attempt seems to be made to provide for Infant Teachers' needs.

This is at least the spade work necessary before considerations of cutting down, and that is all that I can attempt in a short paper.

A discussion followed in which the following took part:—The President, Rev. Dr. Workman, Miss Luard, Rev. Prebendary Corfield, Miss Manley, Rev. R. A. Thomas, Miss Todhunter, Mr. Phipps, Miss Hale, Professor Green, and Mr. Raymont.

The following Resolutions were then passed:—

(i) "That in the opinion of this Association the division of the attention of students taking the Two-Year course in a Training College among so large a number of subjects as at present is the reverse of educational; that the number should therefore be reduced or rearranged with a view to the more thorough study of those which are retained."

Proposed by Rev. Canon Morley Stevenson, seconded by Miss Dunlop.

(ii) "That a Committee be appointed to draft a Scheme for an amended curriculum and to report to a Special Meeting of the Association summoned for the purpose, at a date to be determined by the Committee of the Association.

Proposed by Mr. A. W. Reed and seconded by Rev. R. A. Thomas.

(iii) "That the Committee do consist of the Officers, Miss Luard, Mr. A. W. Reed, Miss H. Brown Smith, Miss Dunlop, and Miss Hale, with power to add to their number.

Proposed by Professor Mark R. Wright, and seconded by Mr. D. Salmon.

1. The following alterations in Rules (recommended by the Committee) were adopted:—

RULE 5.—Addition to the list of Officers—
"The ex-President."

RULE 7.—Addition to ex-officio Members of the Committee—
"The Editor of the Training College Record."

2. The President reported briefly the Method Meetings of the preceding afternoon, the subjects being "The Theory of Teaching" and "Elementary Science."

A hearty Vote of Thanks was accorded Dr. Workman for so kindly allowing these meetings to be held at Westminster College.

In connection with the meeting of the Training College Association, meetings of Lecturers and others engaged in Training College work were held at the Westminster Training College, on Tuesday, December 20th, 1910, for the discussion of special topics.

From 3 to 4.30 p.m. the place of Psychology in the Theory of Teaching was discussed. Papers were read by Professor Mark R. Wright, of Armstrong University College, and Miss Lilian Daly, of Clapham Training College.

Professor MARK R. WRIGHT said he would give definiteness to his contribution by stating precisely the plan that was followed in Armstrong College by Two-Year students. Modifications naturally were made for Three-Year students following a University course. There was a marked change in the present type of student as compared with the type some years ago; the experience in school work previous to entering College had been lessened. He considered that some experience was necessary, and only pupil teachers or student teachers were accepted for admission. It would be a waste of time to give in College details of school work that could be gained more profitably in a schoolroom.

The first course of lectures with First-Year students was taken by himself. They extended nearly over one term, and an attempt was made to give a general survey of the subject. Education was discussed in relation to life, the general position of education in England was considered—its organization, administration, and the inter-relation of the varying types of schools, colleges and universites. The various advantages of education as part of the State were dealt with, and some lectures were devoted to the criticisms that are advanced against "over-education," and the possible enervating effect on the efficiency of the industries and on the virility of national life. A short study was made of the class and the child: the insistent activities of the young child were underlined and contrasted with the depression of such activities in school work. Some attempts were made to describe a child's way of thinking. The moral aspects naturally came in for discussion, and consideration was given to the growth of character, and the influences of home, school and church were set forth. Some of the more striking examples of educational history were touched upon in order to show that an educational system must be part of the life of the State. The possible work in school was indicated, and a plea was made for teaching based upon knowledge of the material and of the studies which must be understood in any rational system of teaching.

Experience justifies a wide preliminary course of this nature. The course finished, the students go to other members of the staff for lectures on the methods of teaching particular subjects, but Professor Wright retains the class for one lecture a week to follow in detail one subject. This year the subject is Arithmetic.

First-Year students receive also a set of lectures for about a term and a half one hour per week; on elementary ideas of logic applied to teaching. The extravagances of some of the text-books on formal logic are avoided, but one recognizes distinct benefit from a simple and clear treatment of knowledge and its relation to language, the principles of definition and classification, inter-relation of inductive and deductive methods and an outline of methods. The illustration examples and applications as far as possible refer to school teaching.

In the Second Year subjects that form the groundwork of teaching were discussed. Much depends upon the selection of material, and while the lecturers tried to give an understandable and coherent view of mind knowledge say, it was recognized that much of the available material was unsuitable for treatment in a short course and to immature minds. One discovered certain points that must receive fuller treatment; for example, sensation as a complex, ideas, the position of language. An enquiry showed that most books read either on child life or teaching had been largely influenced by the "Association School," often probably unwittingly, and one of the greatest difficulties is to induce a cohesive view of mind. It may be a personal view that makes the lecturer deal somewhat fully with feeling, and yet more fully on the consideration of will, with the insistence upon an active, vigorous personality. Most of these subjects are discussed from a development point of view, in order to attempt to destroy the ideas that "child psychology" is something gathered from children of from two to four years of age, a view that is responsible for some of the infantile methods cruelly applied to older children. In the lectures efforts were made to lead the class to appreciate the value of thinking as compared with the collecting of materials for use in thinking: too many schools' exercises are concerned with "collecting."

The lectures are kept as closely allied as possible to experience, to lessons in school. The knowledge gained of methods of teaching in first year is drawn upon, and the subjects are practically revised in the light of the further knowledge gained. It seems unnecessary to set forth how in the Second Year discipline and character found their place.

Each lecture begins by students being called upon to give a resumé of the previous lecture. Discussions are frequent in class, opposition and contradiction are freely invited, especially upon subjects that the class has had time to think about. Exercises are set periodically—not too frequently—upon the subject of lectures. The best results seem to follow from long essays that may take a term or more to complete; we then ask for authorities to be quoted. Such essays give a better indication of the value of the instruction and the appreciation of the students than do the short class exercises or the answers to examination questions.

It follows from the first year "sketch course" that some attempt should be made to deal with the Education of some other period. Several have been tried, but no course is as productive as a study based on Plato's Republic. The following account of the course is drawn up by Miss Richards:—

"A study of this book is preceded by an account of the Athenian and Spartan systems of Education, with brief historical sketch. The object of the preliminary account is to make clear Plato's position in the Republic—to show on what he based his system.

In dealing with the text subjects are given to groups of students (four in a group), who produce and read to the class a joint paper on the subject they select. This necessitates the use of further books of reference. A comparison with modern educational practice is kept to the fore.

Advantages claimed for this course are :—

(i) It involves a definite study of a standard treatise on Education, an important feature in a subject such as education, which lends itself to much "vague talk."

(ii) The study of the Greek system opens a new world of ideas. It necessarily involves constant reference to contemporary history and literature, and may possibly induce some of the class to read further.

(iii) From the spirit of the Republic and from the definite opinions that Plato expresses as to the function and treatment of various subjects of the curriculum, a modern teacher may draw some practical inferences.

(iv) Students reading this book generally seem impressed by the wonderful "modern-ness" of much of what Plato says, and by the ample illustrations that it affords that the problems of education to-day were just as persistent and baffling in the days of early Greece."

In subsequent years other periods will be attempted. A close study of a system considered in connection with the history of a period is better than any attempt to consider a long period of education.

Lectures are only part of the work, and have no meaning apart from the practical work of the course, hence they must be considered in relation to schools visited, the weekly practical exercises in schools, continuous practice, visits for special purposes, weeks spent in the country visiting schools, and the life of students and boys under canvas.

The paper has necessarily dealt with the so-called theoretical bases, but this aspect is never allowed to appear too prominent in lectures. While the clear statements of descriptive psychology, as far as they have a value in teaching, are important, only harm can accrue to two-year students from any course of Psychology as such. There is no need to fear imitating Engineering, Mining, Naval Architecture and other Applied Sciences in borrowing (when necessary) the conclusions of the Science on which these Applied Sciences are based, even when the processes by which these conclusions have been reached are not always understood.

MISS DALY said :—The question as to how best to teach students in our Training Colleges to psychologize is a difficult one. Much thought on the subject and much conversation with colleagues has led me to the following conclusions :—

In the first place the question, "Why do we teach Psychology in Training Colleges?" impressed on me that *our* aim is a *different* aim from that of a lecturer whose business is to prepare candidates for Degree Examinations in Mental and Moral Philosophy. We do not propose to turn out specialists to that extent. Our aim is to give to students a sympathetic understanding of individual children in the schools. In one sense then we need to teach them less, in another sense we must teach them more, than the lecturer whose aim is different. Men and women going into school to live the day with little children want less readiness in using psychological nomenclature about *the* child—they want more power of putting themselves into the place of *a* child. And my experience seems to show that the knowledge of text-book phraseology essential for the one is, if anything, more or less a hindrance to the other. The average students will not *think* as long as they can get something to *read*. And this not from laziness, but because one cannot get the average student to believe that learning somebody else's words is not thinking his or her own thoughts. So that, to use a student's expression, "doing Psychology" is anything but learning to psychologize, which is precisely what a teacher must have some capacity to do, and interest in doing.

Further, I believe it is this over-academic study of *the* child, instead of being encouraged to take a human, everyday interest in *a* child—in *many* children, that has given rise in schools to such abominations as the "class piece"—when fifty or sixty children are made to learn some poem or text judged to be suitable to *the* child of a certain age. As if the "class" did not consist of fifty or sixty little individual people each with his own individual likes and dislikes, and every one ready to enjoy learning something if only he got some individual choice as to what he might learn.

Thus one feels more and more that what we, in Training Colleges, want for our students is less academic knowledge of Psychology and kindred subjects, and much more sympathetic and wise thought about, and interest in, real flesh and blood children.

Thinking thus, one turns from direct lectures on Psychology to consider what is known as "Incidental Method," but is again faced with a difficulty somewhat opposite, it may be, to the first. Incidental Method would seem to sin in a different, and perhaps in our day and generation in a more serious, way than the other. For to make the lesson our central thought with the child as a marginal reference is to make personality subsidiary to subject matter, a very dangerous mistake for students especially to be led into. Because, before all else, a teacher must respect the personality of a little child. And we've all come across the student who plans a good lesson and delivers it well, and successfully prevents the class from interfering with it: and who then is much upset by one's lack of enthusiasm over his teaching capacity.

Thus perplexed as how best to make Psychology or child study less abstract and of real practical value to students, and still to keep the child, rather than its lessons, in the centre of their thought, I tried an experiment which may not be without interest to those who have not already happened on it for themselves.

I started a reading circle. We read stories about children—"The Golden age,'' "Rebecca of Sunnybrook Farm," and others.

I had a system in my own mind, but did not think it advisable to tell the girls this. I made the stories cover the ground of the main mental phenomena. For example :—

(1) The little boy's picture of Rome—in the centre he set down the Coliseum known from a woodcut in his history book; surrounded it with architectural splendours derived from the Wesleyan Chapel in his own village; and the Inn with "Commercial Travellers'' written across the window; and peopled its streets with Roman citizens arrayed in Suffolk smocks.

This enabled us to think about a child's imagination—how it works, and where it needs help.

(2) Again—Harold, who preferred going round the house ringing an imaginary bell, selling imaginary muffins to imaginary passers-by, contrasts instructively with his brothers and sisters who chose more exciting and companionable games, such an organized attacks by Red Indians on peaceful settlers, lion hunts, and the like.

(3) While Rebecca's attempt to punish herself by pushing her beloved pink sunshade down the well, and thus getting into further trouble by interfering with her aunt's water supply, illustrates in a way that comes home to us many things about the mistakes we are apt to make in understanding a child's line of thought and action, and the possible difficulty children may often have in understanding our attitude towards them and their doings.

That this method appealed to the girls was evident. The reading had to come after College hours. Attendance at it was voluntary. Not only did they all come every time, but on one occasion when we were prevented from meeting at our usual time they asked me if I would stay another evening instead.

Another practice that I have found helpful towards my aim of inducing interest in children as individuals has been to take notes, and make students keep notes of the *wrong answers* given by children in class during School Practice. We laughed over them, but we also studied them to ascertain as far as possible why they were given, and in this way learned more about the working of a child's mind. When one is told, for example, that "Crusades were Holy Wars against the Turkeys," or that "Pyramids are nightlights," the need of clearing up a child's conceptions of history and geography by illustration becomes obvious. Or when on asking "On what grounds was Sir Thomas More executed?" one is told "On the grounds of Tower Hill," one learns to take care to word questions so that the youthful mind may find no ambiguity in them. What to do with the girl who informed me in all good faith that Daniel O'Connell repealed transubstantiation, I leave to those of my colleagues who are specialists in Theology!

But I found my experiments a success, in that they aroused in the students with whom I tried them a genuine interest in the children in their classes. And they got to realize better that there is no one infallible "method" for giving any lesson. That the best method will always be the method which best appeals to the particular class in hand. That, therefore, the value of studying several good methods is that one can more readily adapt oneself to individuals and circumstances.

May I, in conclusion, mention a point very near to my own thoughts, and no doubt to the thought of many, the need for always impressing on students a feeling of respect for Personality, for insisting that the real "Self" of any one of us contains something of the unknown—the mysterious, about it. That however much psychologists may map it out into compartments or capacities, duly labelled with appropriate names, there is still a something in the person of "ourself" and other-selves which ever elude the most minute psychological dissection.

I feel that this thought needs emphasizing by each one of us to ourselves more than ever just now when physical science is making its most daring ascent towards the region of the immaterial in the study of "Experimental Psychology." The value of the study, I am sure, no one will for a moment question. But its products may be bought at a very disastrous cost unless those who pursue such study clearly realize that they are still exploring the material universe.

The old "School-men" didn't care about the material universe lying round them. Their interest lay in the "real realities" that most of us still profess to believe underlie and overrule that universe. Well, perhaps they made stupid mistakes in their methods of study—perhaps they even didn't get very far towards their goal. We of the nineteenth and twentieth centuries, with our splendid advances in Science and Medicine, have learnt to understand "Matter," and to control "Force" to our uses, in a way they never dreamed of, whose interest lay beyond the things of Sense.

But is there much cleverness in laughing at a past generation for not caring for things we have learnt to care for? Or is it much to boast of that our very successes in the knowledge of tangible things around us tend to outweigh, or even destroy, our power of realizing anything beyond all that. When girls come to me from lessons on Science, Hygiene and like subjects, with their old belief in unseen things upset and shaken, I feel deeply sorry for them. And one wonders at times how far it is good to give them smatterings of such teaching, if we cannot give them enough. Or at all events cannot give it to them side by side with equally earnest and definite teaching about the non-material side of life, so that their advancing knowledge in the one need not destroy their belief in the other. And I often feel almost consoled by the reflection that though some students get into difficulties which they may, or may not, get out of later on, the great majority, by their very capacity for *not thinking*, escape unhurt from our still imperfect knowledge of the theory of Teaching!

From 5 to 6.30 p.m. the Teaching of Elementary Science in the Training Colleges was discussed. Papers were read by MISS

A. R. Ridgeway (late of Stockwell College), and by Mr. C. H. Swann, St. Mark's College, Chelsea.

Mr. Swann said:—I have been asked to express my views with regard to the teaching of Elementary Science in our Elementary Schools and Training Colleges. The object of this discussion, I imagine, is to improve the teaching of Science in our Schools. There is great need for improvement, because no subject is so badly taught, both by regular class masters and by our students during school practice. I think the following reasons are somewhat responsible for this inferior work:—

(1) The Science syllabuses of our Training Colleges are too varied, because each college submits its own scheme to the Board of Education; and between them they cover a multitude of subjects in Nature Study, Botany, Chemistry, and the whole range of Physics. The result is, that teachers leave our colleges with different smatterings of a few of the many branches of Science. No other subject in the Board's scheme compares with it.

(2) The syllabuses of the Elementary Schools are also varied in the same way, and in order to deal efficiently with them every elementary teacher should be at least a D.Sc.

(3) There is a lack of interest in science among men students, against which one always has to fight. I think the reason for this is that Elementary Science has no place in the final certificate examination. Surely this lack of interest is a natural result when we consider the huge amount of other work that has to be done during the two years training; the men work for the examination, and are not concerned very much about a subject which is not included.

I feel that these reasons present the difficulties which obstruct the path of reform. At present, to overcome them, Science teachers in Training Colleges are expected to deal with their work by teaching on heuristic principles, in order that the student's mind may be scientifically trained and developed. The mind so trained is supposed to be able to grapple efficiently with the many branches of Science in which we dabble The heuretics admit that very little practical work can be accomplished during the period of training, but they say there is that wonderfully developed mind to compensate for lack of knowledge.

For six years I have been endeavouring to discover the bright and compensating side of the heuristic method of teaching science in Training Colleges, and have decided that it is not practicable. Our classes must of necessity average twenty strong, and we are asked to make the students work independently and not in pairs. Success on the heuristic method, as the extremists wish us to work, could only be doubtfully possible with very small classes of not more than six; even then, if any quantity of work is to be accomplished, each student would have to devote much more time to it. From the heuretics point of view it is of no use applying the method collectively, for then the only sensibly deduced answers to leading and logical questions come from a very small proportion of the class, and the majority benefit but little.

To establish further my objections to the extreme use of heuristic teaching, I will briefly outline our method of arranging Science classes at St. Mark's College. Taking the men as they enter in September, we first separate those qualified for University work in Science and Arts. An average of fifteen are set apart for this work, and then during the first term the rest attend one lecture a week on Science, and in addition each man does a two-hour session of practical work. At the beginning of the second term of residence the most capable of these are formed into an optional Science class in Chemistry, Physics, or Botany. These classes generally claim from fifteen to twenty men, and the remainder, that is, the whole year minus those taking University Arts, Science, or optional subjects, take the college elementary science course. The standard in these optional subjects has been fixed by the Board of Education at something higher than that of the subjects in the London University Intermediate Science Examinations. We endeavour to devote four hours a week to each of these subjects. I tell you candidly that the only way to obtain laudable results in these subjects is to cram the candidates in just the same manner as we do the University men. Will any reasonable person say that the quantity of work could be accomplished, and the necessary knowledge absorbed during the period of training, on heuristic principles of teaching? If Science teachers in Training Colleges had conscientiously endeavoured to take their degrees by working on these methods would they ever have graduated? I think not. Straight teaching and hard reading from good text books provide the only successful methods of dealing with our University and optional classes. I see no reason why our Elementary Science classes, undoubtedly consisting in the majority of cases of men of inferior calibre, should be taught on different lines in order to develop scientific minds! The heuretic may say that men taking University and optional courses in Science have had previous training on heuristic principles, and this is the reason for their superior quality; but they all come from similar types of schools, and I am not prepared to believe there is much difference in the methods of teaching, though facilities for teaching may have had an effect on results; the best men of course are the most successful.

The quality of teaching depends entirely on the teacher's knowledge, training, and natural ability. If the good teacher, during his training, gleans but a smattering of Science he cannot teach the subject efficiently. He learns how to apply proper methods of teaching from the normal master, and I see no reason for hindering the absorption of knowledge, in the little time at his disposal, in Science more than in Mathematics, English, or History. With the present full syllabus of Mathematics, the lecturer has no time to discuss the methods of teaching. It is more difficult to compare the teaching of Science in Training Colleges with the teaching of English and History, but in these latter subjects we make direct use of standing authorities; why not make direct, and not indirect use of the wonderful work of our past and present eminent scientists? The good teacher, in an English or History lesson, will make his class work, and so he will in a Science lesson, but it is too much to expect that the average child or adult should be able to re-discover all our fundamental physical laws. Surely the tendency of the scientific brain, a natural brain, is to read and absorb the best that modern Science can offer, and then to proceed on that basis of knowledge to research work. I am prepared to agree that the scientific mind can be much better developed by heuristic teaching if applied under special conditions, and they are that the mind should be very young—a child's—and under the permanent and isolated control of a Science teacher of unusual ability; but for large classes heuristic teaching is too disheartening and impracticable, both for the average student and the average teacher. We cannot attempt to solve this question of Science teaching in our schools until we get into a more mechanical groove and arrive at a uniform system. We want in our Men's Training Colleges a uniform and more restricted syllabus, and the same, though perhaps of a different nature, in our Women's Colleges. In agreement with this, we must have a uniform syllabus for all our Elementary Schools. The student doesn't learn one kind of Mathematics in College and teach another in School; why should he learn one branch of Science in College and teach another in School? The Board of Education regulations say that each College must submit its Science scheme according to its facilities for teaching. There should be no necessity for this proviso, because if any of our Colleges are not equipped with proper laboratories, then those Colleges ought to be condemned in that department. In addition to these uniform syllabuses, I would like to suggest that the Science which is taught to our prospective students while at Secondary Schools should lead up to the work they are going to do in College! This should not be difficult to arrange. The future teacher would then, in his Elementary School, Secondary School, and Training College, have a logical and progressive course of training which should give him a real scientific standing at the finish of his College career. Students on admission to College should be grouped according to their attainments and capabilities. The best could take optional science subjects, but there is no reason why those who take the elementary course should not be taught on exactly the same lines. They should attend as many lectures, do an equal amount of practical work, and study the same text books. Surely having once done the work, it would be easier, when the necessity for teaching arose, to revise and augment that work, than to attempt, with the aid of the doubtful scientific mind, to learn the matter afresh. Also it would be much easier to sustain interest with men students if they knew a little about what they were doing, rather than to ask them to grope in the dark, endeavouring from one conclusion to deduce another, until the demonstrator could help them heuristically in turn. Small wonder the students become heartily sick of the whole business!

If we work on the lines I have suggested I am sure that we should not have to listen to so many deplorable lessons, now so common in our Elementary Schools. But no student will sufficiently realize the importance of Science teaching until he has to work a theoretical paper in the final certificate examination; that, to my mind, is an absolute necessity.

Even though working under these conditions we should probably find the need of cultivating in our students a conception of the vital necessity for skilful manipulation of apparatus before a class; experiments must come off in order to be convincing. This lack of skill among students and qualified teachers is always painful to watch. At St. Mark's College we have endeavoured to improve matters by holding manipulation lessons, and these lessons have proved the most successful branch of our scientific work. Each senior student is asked to carry out a series of experiments for half an hour to demonstrate his methods of teaching some particular branch of Science. About four of these lessons are going on at the same time, and the rest of the senior students are divided into four groups, each group acting as a class to each manipulator. After the lessons we gather together and criticize the work which has been done. The lessons chosen are those most common in the Elementary School curricula, and each student during his half hour is expected to carry out successfully as many experiments as possible to illustrate his particular lesson. Of course he may do enough to last for several school sessions, but we don't mind that. Our aim is accomplished, because the student is forced to rehearse his experiments beforehand, and also to know something of the subject. We tolerate no faulty work on the part of the student, but it is very rarely necessary to ask a man to repeat his manipulation lesson because his work has been unsatisfactory. These lessons have been successful because our men have been able to see at once, by many practical demonstrations, the necessity for skilful work before a class; and, what is perhaps more important, they realize that the most successful lessons are given by men who spend hours in careful preparation of them.

In this paper I have avoided technical details in order to make clear my suggestions for reform on broad lines. These suggestions will probably meet with much opposition, but they will have to be followed sooner or later; of that I am convinced.

Failing reform, the only other alternative to the existing state of chaos which I can suggest is the entire suppression of Science teaching in our Elementary Schools and Training Colleges.

REVIEWS.

"How we Think." By John Dewey, Professor of Philosophy in Columbia University. London, n.d. [1910], 8vo. pp, vi, 224. Price, 3/6 *net*.

THIS essay is specially intended for teachers, and they will do well to read it. Professor Dewey holds that the teacher should aim at producing in his pupils "that attitude of mind, that habit of thought, which we call scientific," and he has set himself to answer two questions: What is the nature of thought? and, How are the young to be trained in it? His book, therefore, may be regarded from two points of view, one psychological and logical, the other pedagogical. The psychological and logical analysis is in general outline, as one would expect from Professor Dewey, both lucid and interesting, though in details it seems to me occasionally to be a little obscure, perhaps because the author has intentionally avoided very controversial points. His pedagogical conclusions appear to be for the most part uncommonly sensible—most uncommonly, indeed, if the theories which he controverts are fair samples of pedagogical doctrine.

Professor Dewey begins by marking off the sense in which the term "thought" is to be taken for the purpose of his enquiry. He excludes mere random association and imagination that does not aim at belief, nor is he mainly interested in beliefs determined by tradition, instruction, imitation, or generally otherwise than by evidence. There remains reflective thought, and thinking in this sense is defined as "that operation in which present facts suggest other facts (or truths) in such a way as to induce belief in the latter upon the ground or warrant of the former." Now it is a great point gained that we are thus introduced to thought at the outset as an inferential process: the ordinary text-book of logic starts with judgment or even with terms, and so clouds the student's mind for ever. But at the same time I do not find the slight sketch of inference in this first chapter very easy or clear. Reflective thought is at first described as thought about the grounds or reasons of a belief and its logical consequences: it therefore presupposes a belief. With that everyone would agree, but in the next section we are introduced to "the central factor in thinking," and this turns out to be, in all kinds of thought, suggestion, and in reflective thought, significant suggestion. (Thus a cloud may *suggest* a human form, a sudden coolness in the air may *signify* rain coming.) Hence the final definition of reflective thought as given above. The difficulty that I find in this statement may be put in several ways. (1) According to this account, the central factor in reflective thinking is a process anterior to reflection, if it is meant that I first feel cold, then think "that means rain coming," and then reflect upon my judgment. (2) We surely need an explanation of the term "facts." Professor Dewey sometimes speaks of "facts," sometimes of "things," as signifying, and sometimes he uses other words; but on his own showing, that on which reflective thought reflects cannot be merely perceptual experience, but must be belief (or, at any rate, supposal.) (3) If it is replied that appreciation of significance involves belief (or supposal) from the outset, then I would contend that much of Professor Dewey's language needs modification, and especially the emphasis that he lays upon suggestion. Of course it is true that suggestion—that is, the being suggested—of an idea or hypothesis or belief is necessary, but Professor Dewey lays so much emphasis on it and seems to describe it as so purely automatic, that all activity seems to be excluded. No doubt, when he comes to concrete examples, he has to admit that we hunt for hypotheses, and not only for corroboration of them; but he does not lay enough stress on this aspect of the process in his formal account of it.

The fuller discussion of reflective thought in the central chapters of the book is much more satisfactory, and it is a pity that the author did not begin with them. Something of false emphasis remains, perhaps, but the analysis of reflective procedure into five logically distinct steps—a felt difficulty, its location and definition, suggestion of a possible solution, development by reasoning of the bearings of the suggestion, and further observation and experiment leading to its acceptance or rejection—is worked out in a simple and interesting manner, and the place of deduction in inductive procedure is very well presented.

Then follow chapters on Judgment, Meaning, Concrete and Abstract Thinking, and Empirical and Scientific Thinking. Of these the chapter on Concrete and Abstract Thinking seems to me the least satisfactory. Desiring to find some sense in the pedagogical maxim "to proceed from the concrete to the abstract," Professor Dewey first says that "concrete denotes a meaning definitely marked off from other meanings so that it is readily apprehended by itself" without reflection. Now the ordinary distinction of concrete and abstract in Logic is, perhaps, not very satisfactory, but it certainly is not equivalent to the distinction of familiar and unfamiliar, and it seems a pity thus unnecessarily to use old words in a new sense. The author himself seems a little uneasy, for seeing that "the difference as noted is purely relative to the intellectual progress of the individual" he afterwards refers it to the practical demands of common social life; the concrete is that of which we all have to take practical account, the abstract is the theoretical. Hence, thinking is concrete when it aims at an end beyond itself, abstract when it is inspired by purely theoretical interest. Granting this sense to the words, which I am not inclined to do, we may certainly agree with his practical advice "that we should at the outset make much of doing" (not merely exhibiting objects to children, but encouraging them to understand objects by using them), and that when interest has been transferred to intellectual problems in themselves, still we should remember that theoretical knowledge is only one end, and should aim at producing a working balance between abstract and practical interests.

This brings me to the pedagogical chapters,—for such criticisms as I feel disposed to make on the chapter on Meaning would lead me into the heart of the Pragmatic Controversy, and I will only say that I cannot without much qualification accept the statement (p. 125), "Familiar acquaintance with meanings signifies that we have acquired in the presence of objects definite attitudes of response which lead us, without reflection, to anticipate certain possible consequences." The author begins by describing the need for training thought, and brings out very clearly those defects of the untrained mind which are patent to every householder in the average domestic servant. After mentioning the natural resources which all training of thought presupposes, tracing the growth of curiosity, and discussing individual variations in fertility, facility and depth of suggestions, and in orderliness of thinking, he emphasizes the influence of practical activities upon the formation of habits of thought, regarding as the most serious of all pedagogical problems the discovery and arrangement of those practical activities that are *at once* congenial to the immature mind, preparatory for adult responsibilities, and productive of habits of acute observation and consecutive inference. (Though on the whole I agree with the author here, yet I think that he and many other writers on education at the present time are forcing their psychology a little in order to suit their theory; I believe that what Dewey calls "abstract thinking" begins to have an interest of its own for many children at a much earlier age than they suppose, and I would conjecture that they are misled by observation solely of town-bred children, who live too much in a hurry and have too many distractions to care about apparently unpractical knowledge. Certainly my experience does not support their unqualified generalisations.)

The chapter on School Conditions and the Training of Thought is full of sensible remarks. Formal discipline is condemned (perhaps a little too vigorously) on the ground that any subject may serve to train the intelligence, if rightly pursued, and that different subjects are best adapted to different individuals. The superiority of wisdom over mere information is insisted on (rightly on the whole, but again, perhaps too vigorously, for information is often wonderfully useful), the danger of too great reliance on personal influence is emphasized—"Is this right?" comes to mean "Will this answer satisfy the teacher?"—and also the danger of checking natural fertility of thought by too strict a demand for "correct answers."

In the next chapter Professor Dewey states more precisely the *intellectual* end of education, viz.: "the formation of careful, alert, and thorough habits of thinking," and argues that the formal exposition of a subject does not provide the requisite training, because, though logical, it is so with the logic of the mind already trained and already conversant with the subject; the first business of the teacher must be to train natural practical activities to intellectual uses along lines of normal psychological development.

The later chapters, which follow on the fuller logical analysis of thinking, amplify the considerations already mentioned, They deal with the bearing on the training of thought of activity, language, observation and information, and "the recitation." The space at my disposal will not permit me to go into details; I will only say that the criticism of "object-lessons," "nature-study," "the formal steps," and other shibboleths seem to me rare common sense; but perhaps the verdict should be left to those who have had the misfortune to be taught according to these special patents.

T. LOVEDAY.

"The Training of Teachers in England and Wales" by Peter Sandiford, M.Sc., Ph.D. (New York; Teachers' College, Columbia University).

Many of our teachers ignore the lessons which the history of education, and many of our administrators the lessons which the systems of other countries would inculcate, but in America many teachers and many administrators strive seriously to learn from the experience both of the past and of the present. In our last number I noticed a comprehensive work on French Secondary Schools, and now we have from the same country a work equally comprehensive (though necessarily smaller) on one department of our organization.

The Training College is only a wheel in a complex machine, and in order that the operation of the wheel may be fully understood, Dr. Sandiford begins with a description of the whole machine. The second chapter is historical; the third deals with preliminary education, the fourth with the training of elementary teachers, and the fifth with the training of teachers other than elementary. The remaining chapters do not deal directly with the training of teachers but discuss sundry related topics.

Dr. Sandiford has gone to the proper sources for his information, has collected it with great care and industry and set it forth very clearly, so that his American readers will know much more than the average Englishman about our system of training, and the best informed Englishman can detect few errors of any kind and none of any real importance. In the hope that a second edition will soon afford an opportunity for correcting them, I point out the following :—

The Board of Education Act is said (p. 5) to have made possible the "transfer by the Privy Council of the powers of the Charity Commissioners *of* the Board of Agriculture" (instead of "the Charity Commissioners *and* the Board of Agriculture"); what was "published in the fall of 1909" (p. 9) was not a "revised edition" of the Suggestions to Teachers, but only revised editions of two or three chapters; what is inaccurately said on p. 10 about the "introduction since 1882 of professionally trained inspectors" is inconsistent with what is accurately said on p. 13 of the present inspectors' "lack of knowledge of pedagogy"; it is wrong to speak of "the monitorial system of Bell and Lancaster" (p. 35) as the systems of the two men differed considerably; it is wrong to say (p. 36) that Lancaster "did not actually sever his connection" with the British and Foreign School Society "till 1818" as he resigned on April 23rd, 1814; the London Day Training College is in Southampton *Row* not *Street* (p. 54); the date of the third edition of Lancaster's "Improvements" is 180*5* not 180*3* (p. 161); Municipal Boroughs were not "created" by the Act of 1882 (p. 20); and to speak of "civil servants with the exception of army and navy officers" (p. 7) is an obvious slip.

An English reader will probably learn no new fact about England, but he will incidentally learn something about America when he finds Dr. Sandiford noting that "the statistics of the Board of Education are absolutely reliable" (p. 8); that the "attendance at School of English children is unusually excellent" (p. 26); that "much greater deference" is shown to our lecturers "by the students than is the case in American Normal Schools" (p. 75); that "the introduction of the common room idea both for students and faculty [staff] would add greatly to the spirit of the social life in American Normal Schools" (p. 90); that the head teacher "possesses a greater degree of both freedom and responsibility" in England than in America (p. 106); that the clerical work "which for the most part could be as efficiently done by a low salaried secretary, takes the [English] head teacher away from his more important teaching and supervisory duties" (p. 106); and the "tenure of teachers is on the whole more secure in England than in America" (p. 108).

To us, the most interesting and the most valuable part of the book is the comparison between English and the American systems which Dr. Sandiford, with an unusually complete knowledge of both, makes (p. 147). He finds, *inter alia*, that our colleges enjoy a "great degree of real freedom"; that "the loop-holes of escape from training, or rather the easy access to the schools without training, is one of the most serious defects of English education"; that "the academic training which the prospective teacher receives in an English Training College is decidedly superior to the professional"; that "the weakest part of the 'program' of studies is the lack of attention to psychology and the history of education"; that "the practice teaching, which is only of six or eight weeks duration, is another weak point in the English system"; that "the kingdom-wide" and life-long "validity of the teachers' certificate . . . . undoubtedly contributes towards an excellent professional spirit among the teachers"; and, finally, that "while the present system of training teachers is open to serious criticism from several points of view, it cannot be denied that the possibilities of future development are encouraging in the highest degree for the future progress of English education."

DAVID SALMON.

"**Social Education,**" by Dr. Colin A. Scott (xi + 300 pp.), Ginn & Co. 6/-

This book may be heartily recommended to English students of education on two grounds. Firstly, it contains an account of experiments conducted by the author. Secondly, Dr. Scott works out his views on the reform of teaching in various branches of method which he has made his own, especially in regard to Fine Art. As regards the experiments, the leading idea is that children will make better progress if, for a portion of their school time, they are permitted to organize their own activities in what the author calls "self-organizing groups." He permitted the scholars in a large class to employ their time during three of the weekly school periods exactly as they pleased so long as they remained on the premises, and engaged in some employment which did not disturb the rest of the community. Among the activities which they undertook were:—Printing, three cooking groups, a photographic group, and two groups for plays. One remarkable feature of the experiment was that one of the forms of activity soon led to looking to others for auxiliary aid; thus the cooks wanted their receipts printed by the printers.

The relation of the teacher to these groups was that of an adviser to be consulted when wanted, but she refrained from interference until asked, and her active interference was only required when occasionally some unruly member quarrelled with her group, which then desired to get rid of her.

The first part of the book contains a theoretical discussion of the school as an organism with criticisms of well-known experiments, such as those of Dr. Reddie, of Abbotsholme, and Professor Dewey. We regard it as one of the most important contributions to educational reform in recent years.

J. J. FINDLAY.

"**Educational Aims and Efforts,**" by Sir Philip Magnus (xii + 284 pp), Longmans & Co. 7s. 6d. net.

This volume is a collection of addresses and essays contributed at various times during the last twenty years by the author, and prefaced by five chapters, partly biographical and partly explanatory of the author's position in public education. The volume will be of permanent value on the bookshelves of a student of education as a record of important influences at work in England during the last generation. It was in 1880 that Sir Philip Magnus first began his public career as Organizing Director and Secretary to the City and Guilds Institute, he has had a share in most of the public movements on behalf of Manual Training, of Industrial Education and of Higher Education in London since that date. A book of this kind is, of course, not likely to attract the general reader, but the many friends of the author will be pleased to have a record which reviews his long life, and will welcome the many references to distinguished publicists which it contains.

J. J. Findlay.

"Health Studies" by Ernest B. Hoag, A.M., M.D. (vii + 225 pp.) D. C. Heath & Co., 15 York Street, W.C.

This is an excellent little manual for the older pupils in schools, and it will also be found of considerable value to teachers and lecturers on School Hygiene.

Not only does it describe in plain and simple language the elementary anatomy and physiology of man, but the chapters on contagious diseases and their control, the causes of disease, colds and their prevention, and Public Health, are written in a clear and interesting style, which makes the book a very valuable one.

At a time when it is recognized that the most important duty of those responsible for Public Health is to teach men and women the simple facts about the causation and prevention of disease, Dr, Hoag's little book will be welcomed as an important addition to the text-books on this subject.

R. P. Williams.

"The Dawn of Character," by Edith E. Read Mumford, M.A. (pp. xi + 225.) Longmans, Green & Co., 1910. 3s. 6d.

It is in the apparently small, but really very significant incidents in the little child's daily life in the nursery, that we find our character-building material; the continual single acts of good, or otherwise, will result in modes of conduct, which gradually harden into character, and "character is that which a man wills uniformly." How can the child be "won over" to the side of right? How can we deal with him so that his judgment shall "meet the command half way," and our direct government of nursery days give place to that fine self-discipline and inner freedom which shall make him able to act independently of external authority, inclining always to the Right?

The Dawn of Character gives very suggestive treatment on these matters, the keynote of the book being that "faults in children are problems to be understood, and not obstacles to be forcibly removed," and the "understanding" becomes easier as we notice the judicious blending of the sympathetic point of view taken entirely from the child's standpoint, with the wider vision concerned with the future welfare of the child,

The "five little teachers" and their friends offer plentiful examples of the normal child's outlook on life. We have often run to the little child in bed, fearful with vague alarms in his dark nursery; we have heard the argumentative boy who constantly reasons with his mother over the state of his hands at the dinner table, and we know the child who wonders far more over "the way they make the gas and bring it along pipes into everybody's houses, and the way it gives light in the night," than over the phenomena his nature-loving friends suggest to him. The child who dawdles over her meals, the forgetful little girl who never can remember the message properly, the boisterous baby, so often the innocent cause of unruly behaviour on the part of the older children at nursery meals, are discussed wisely and helpfully.

In Mrs. Mumford's plea for simpler toys, and the cherishing of the greatest of all gifts—a great imagination, one is reminded of Ruskin's picture of the child playing alone in the garden with an acorn cup—now it is a golden goblet, and now a fairy's cap or boat. "Give it me," cries the child, "and I will make more of it." And so the stick boat still sails on her perilous and wondrous voyages across the Round Pond, and children still play Indians in the dark shadows of the garden bushes, or behind the sofa in mother's drawing room. Perhaps more stress might have been laid on the great need for infinite patience, in these early stages of character forming. "Did you say I was to go upstairs—den I just won't!" declares Peggie, four years old, but given the time to order herself she goes willingly. "Just wait, I'se thinking, now I've thinked, and I want to go upstairs. . . . I'll want to be good presently, but not yet—I'll tell you when."

The two chapters, Freedom within the Law and the Dawn of Religion, yield familiar situations, which wisely and tenderly treated lead the child to give that "only obedience worthy of the name, that of the free man, who chooses to obey because he understands the law." Two small boys came home one day with their clothes smeared with waggon grease. Their mother, instead of scolding, made them help her clean them with turpentine. After working some time, one said: "Mother, this stuff does smell horrible," but he had to scrub away till most of the grease was off. "Well, I should think you would be more careful about going into that shop again," remarked his mother, as she helped him put away the turpentine and rags. "You bet, I will!" was the satisfactorily emphatic answer.

Mrs. Mumford has certainly succeeded in giving mothers, teachers, nurses and all who have the intimate care of little children a "psychology which is above all else a living science," in close contact with daily experience.

Woutrina A. Bone.

"**The Voice,**" by W. A. Aikin, M.D. (viii + 159 pp.) Longmans, Green & Co. 7s. 6d. nett.

This is a valuable book, written from the standpoint of a medical man who has made a close study of sounds and of the human organs by the aid of which they are produced. Like other writers he begins with the important subject of Breathing. He points out that abdominal breathing is too low and costal breathing too high; the term which he uses for the type of breathing advocated is "central." His suggestions for breath exercises are moderate and sensible. He directs, however, that in doing the exercises the breath should be taken in through the nostrils with the mouth closed. The importance of the first part of this advice cannot be exaggerated. The danger of taking breath through the mouth for those who work, as teachers do, in a chalk-laden atmosphere, is very great. It is probable that thousands of teachers throughout the country are away from their work every day through throat trouble arising from improper breathing. But the difficulty of the teacher lies here: it is impossible to close the mouth during continuous speech every time breath has to be taken. The problem, therefore, is to learn to take breath through the nose with the mouth open. Very few teachers or speakers do this. Though they would be ashamed to be classed as "mouth-breathers," the fact is that most teachers and most public speakers breath through the mouth when they are talking. The art of breathing through the nose with the mouth open is not easy of acquirement, but it is worth any amount of practice, and we regret that it is not advocated in Dr. Aikin's valuable book.

A special feature of the book is the importance attached to the resonating spaces of the neck. It has been usual to attribute resonance to the cavities of the mouth and nose, and Dr. Aikin has done good service by showing the part played by the neck in the production of sound.

The least satisfactory part of Dr. Aikin's book is the Pronunciation Chart. The use of a phonetic script, such as that of the Association Phonétique Internationale, would have resulted in a much more accurate classification of sounds than he has given us. Among what seem to us the errors of this part of the book are the following. No illustration is given of the sound occurring in the last syllable of "slipper"; the vowel sound in "high" is said to be a combination of those in "hum" and "hit"; that in "hair" is given as a compound of those in "cat" and "her"; the vowel sounds in "hay" and "hoe" are both given as simple, not as compound, sounds. It is a pity that so useful a book should be marred by such blemishes. Dr. Aikin says truly, "The study of phonetics cannot be regarded as sufficient for the needs of the voice." At the same time it must be maintained that a very slight attention to the principles of phonetics would have prevented such mistakes as those to which attention has been drawn.

V. W. PEARSON.

"General and Regional Geography for Students," by J. F. Unstead and E. G. R. Taylor; pp. 516; George Philip & Son; 6/-.

The large number of text-books that have appeared during the last decade or so is the best evidence of the effort that is being made to broaden and humanise the teaching of geography. Not only the subject matter but the method of teaching receives its share of attention; while some class-books aim at popularising the subject matter of geography by gathering together a wealth of interesting material, arranged with more or less attention to causal relations, others emphasising the more pedagogical aspects of the method to be adopted in treating the subject. Description and exposition must give way to "laboratory" methods we are told. *Quot homines tot sententiae*, yet it is doubtful whether a really satisfactory elementary class-book is in existence.

The difficulties confronting the author of an elementary text-book seem to be augmented rather than diminished when a more advanced book of only moderate compass is projected. Messrs. Unstead & Taylor at any rate labour under no illusion as to the nature of the problem involved in writing such a book that "attempts to survey broadly the whole field of geography and includes therefore the subject matter of what is frequently termed physiography as well as that of political and economic geography." Bearing the limitation in mind, they have produced a book that will be welcomed by non-expert geography teachers to whom a good deal of the information is not always readily accessible, and it should prove very helpful to training-college students, especially if supplemented by judicious selection from the useful list of reference books appended at the end of each section.

In spite of the care that has been bestowed on the book, it undoubtedly suffers from compression both in style and clearness. No student will gain anything like a correct idea of the currents and drifts of the North Atlantic from the account given on pp. 142-5, while the treatment of Regional Geography in Part II, which follows much on the lines of Dr. Herbertson's *Senior Geography*, is very dull.

The book is well illustrated by diagrams which should be of great value to the student if enlarged and coloured, providing it is remembered that in the main diagrams of geographical distributions do not pretend to be more than the merest approximation to the facts. The divergences existing between some of these maps and the coloured wall maps recently issued by the Oxford University Press are eloquent testimony to the need for more reliable geographical data. As a case in point, a comparison of fig. 84 (Mean Annual Rainfall) and fig. 95 (Distribution of Natural Vegetation) with the corresponding maps of the Oxford series brings out interesting discrepancies in Africa and in N. America, but even the Oxford maps are not free from inconsistencies among themselves.

C. BIRCHENOUGH.

"The Training of Infants," by H. Kingsmill Moore, DD. (xii + 102 pp.), Longmans, Green & Co. 2s.

THIS book is evidently written for the guidance of teachers of infants in Church Schools, and by infants the writer makes eight years the upward limit; there is no limit on the downward side. The first part of the book seeks, not unsuccessfully, to explain some of the characteristics of young children, without the use of scientific terms; on this the work of the Sunday School is to be founded. He notes very carefully that an infant is not an adult in embryo, but different. He demonstrates the need for child study, then he proceeds to deal with the following important traits: the need for activity, and some of its typical forms, imitation, curiosity, imagination, the play instinct, the lack of a moral sense. He works out at some length the meaning of apperception. This is all clear and simple, though somewhat trivial and uninspired. It is difficult to say whether such fundamental points are not more dangerous than useful when touched on so lightly and with so little application to life.

Presumably the second part of the book is the application of these topics to Sunday School teaching. The aim given is "to get the Bible and religion welcomed and loved for their own sake," and following this are two statements: "All the work in the Infants' School should be of the nature of play," and "Talk is and must be the chief means of educating our children."

The means provided for activity are marching, singing, drawing and modelling. Pictures and objects for illustration are strongly recommended, and for the lessons, of which there should be two every Sunday, each of fifteen to twenty minutes, stories should be told in such a way as not to be wearisome. For choice, the Church Calendar is taken for granted—no mention is made of selection—and among examples cited are the sacrifice of Isaac, the quarrel of Cain and Abel, the death of Stephen, the sacrifice of Elijah, and the Prophets of Baal. Teachers are warned against spoiling stories by definitions. For example: a "synagogue" and a "centurion" are to be made real by reference to the infants' knowledge of churches and of different ranks in the Army.

Possibly the description is sufficient for anyone with educational sensitiveness. For those whom tradition or habit may have blunted the following tests could be applied:—

What mental content has an infant for such lessons, if the principle of apperception is granted?

Are play and activity fundamentals, or simply sugar coatings by means of which the pill is to be swallowed?

Should we treat any other part of our literature in this way, as part of the education of infants?

Is the aim set out likely to be fulfilled?

H. BROWN SMITH.

SHORT NOTICES.

(Books noticed under this heading are not necessarily excluded from more detailed review later.)

"An Introduction to Psychology for the use of Teachers." (2nd Edition) by J. H. Wimms, M.A., B.Sc., (xiv and 148 pp).

The second edition of this book shows that it is filling, more or less adequately, a real gap. The author has modified his original text here and there to meet criticisms, but the book seems to us to sacrifice its psychology to its pedagogy—in the long run a fatal mistake in the interest of both subjects.

"How to tell Stories to children," by S. C. Bryant. 256 pp. G. G. Harrap & Co.

An attractive and stimulating treatment of a very important topic. It is addressed to women (the teacher is always *she*), and the stories selected and adapted for use are all especially suited to young children. We can heartily commend the book to all whom it seems primarily to concern and to many others who were not apparently in the mind of the writer.

"Study Book in English History from Chaucer to the close of the Romantic Period" by E. R. Hooker. (x and 315 pp.), G. G. Harrap & Co. 3/6.

A sane and useful handbook for those teachers who wish to be spared the trouble of preparing "assignments of reading, bibliographies, topics for study, and lists of essay subjects"; even an experienced teacher will find it a suggestive presentation of the method adopted by a colleague.

"The Elizabethan Shakespeare." "The Merchant of Venice." Edited, with Introduction and Notes, by W. H. Hudson. (xlvii and 181 pp.) 1/6.

An excellently printed edition of the first folio text with unusually full *apparatus criticus*—a thoroughly scholarly piece of work.

"An Introduction to the Study of Literature" by W. H. Hudson. (432 pp.) G. G. Harrap & Co. 5/-

The text contains the substance of twenty-five lectures given to large University Extension audiences. It is not in any sense a History of Literature; it is a book about books which will do for the readers who have had no literary training just what "How to look at Pictures" has done for thousands to whom the classics of the National Gallery were impenetrable, and therefore, unattractive mysteries. From the pedagogical standpoint, the book is well worth the attention of teachers of literature.

"Public Schools for Girls." A Series of Papers on their History, Aims, and Schemes of Study, edited by S. A. Burstall and M. A. Douglas. (xiv + 302 pp.) Longmans, Green & Co. 4/6.

Taken as a whole, these essays will be most useful as a guide to what is actually going on in the schools to which they refer. It is inevitable that they should be of varying pedagogic value. Is it not a pity that the Association of Head Mistresses should make use of that misleading adjective "Public" in connection with their schools, unless they mean to bring the Primary Schools for Girls within their purview. The title will mislead everybody outside and not a few inside our own country.

"Science of Education," by T. P. Keatinge, B.A. (130 pp.) Longmans, Green & Co. 4/6.

A simple exposition of the psychological bases of education. Its author is a Faculty psychologist, perhaps without knowing it.

"Dictionary of French and English, English and French," by J. Bellows; revised and enlarged by his son, W. Bellows. 5/- net.

A welcome reappearance of an old friend, still probably the best handy dictionary we have, alike for its arrangement and for its fulness.

"Child Problems," by G. B. Mangold, Ph.D. (xv + 381 pp.) The Macmillan Co., New York; 5/6 net.

A comprehensive, if somewhat slight, survey of the various influences—educational and social—that affect the lives of children. Its actual information relates chiefly to the United States. The book is meant for the citizen without special knowledge.

"Sociology, its simpler Teachings and Applications," by J. Q. Dealey, Ph.D.; 450 pp.; G. G. Harrop & Co.; 2/6.

A clear and simple introduction to a subject which responsible schoolmasters might reasonably be expected to study. Dr. Dealey cannot compete with Herbert Spencer in the flow of his periods, but he is all the "safer" for being less rhetorical in his style.

BOOKS RECEIVED.

"The Teaching of Needlework," by Miss H. M. Bradley, B.A.; 88 pp.; W. B. Clive; 1/6.

"Hossfield's Polyglot Correspondent"; 461 pp.; Hirschfield Bros.

"French Grammar" (Hossfield's Method), by A. P. Huguenet, revised by H. P. Weintz; Hirschfield Bros.

"German Grammar" ditto, ditto.

"Europe." A rational and suggestive text-book of Geography for pupils in secondary and primary schools, by J. W. Powell, M.A.; 102 pp. (paper covers); E. J. Arnold.

"Yorkshire." A Geographical Handbook for Teachers and Scholars; 56 pp.; E. J. Arnold; 2½d.

"How to speak English," by a Teacher of English; 62 pp.; Longmans; Paper Covers; 6d. net.

"How to write English," by a Teacher of English; 59 pp.; Longmans; Paper Covers; 6d. net.

Papers by Members of the Department of Education, Armstrong College; Series 1, 2, 3, 4; Edited by Prof. Mark R. Wright; Reid & Co. (Paper Covers, 1/- each net.)

"Parent and Child," by Sir Oliver Lodge; 73 pp.; Funk, Wagnalls & Co.; 2/-

"How to Study," by F. M. McMurry. (viii + 324 pp.) E. G. Harrap. 5/-

"Longmans' Continuous Story Readers."—Various volumes.

"How to develop Self-Confidence in Speech and Manner," by G. Kleiser. Funk & Wagnalls.

GENERAL NOTICES.

There is to be an International Conference of Students of Childhood at Brussels during the first fortnight in August. The members of the International Committee are Professor Meumann (Halle); Professor Netchajeff (St. Petersburg); Professor Cattell (New York); Dr. M. Bomfim (Rio de Janeiro); Dr. Trèves (Milan); Dr. Philippe (Paris); Professor Schuyten (Antwerp); Dr. (Mlle) Joteyko (Brussels); Professor Gheorgov (Sofia); and Professor J. A. Green (Sheffield). A large and influential British Committee has been formed under the Presidency of Sir Edward Brabrook. It is hoped that Great Britain will be well represented both by the number and importance of contributions and by a large attendance. The subscription to the Conference is 20 francs.

The Committee of Section L of the British Association, which has now presented two reports on *Mental and Physical Factors involved in Education*, has decided to institute an inquiry into the methods at present adopted in the selection of children for the mentally deficient schools. A *questionnaire* has been prepared for circulation amongst the responsible people at home and abroad.

An interesting educational experiment on a large scale has just been decided on for the city of Leipsic. In each of twenty-three schools, the children are to postpone formal work at the three R's until they are seven, which means that during the first school year (school attendance begins at six) they are to spend their time in handwork, in purposeful walks, and in oral exercises. The scheme is so contrived that parents who mistrust the arrangement can send their children to a neighbouring school where the usual curriculum is followed.

The Institute of Applied Psychology (Berlin) is organizing an exhibition on the occasion of the International Congress of Experimental Psychology, which is to meet in Berlin during Easter, 1912. The exhibition will give special attention to pedagogical reasearch, and large collections of psychologically noteworthy school and other products of children's activities will be shown. The Institute invites contributions of that kind, which should be sent to Dr. Bobertag, Neubabelsberg bei Berlin, Kaiserstrasse 12.

Professor E Meumann's journal, *Zeitschrift für experimentelle Pädagogik*, has come to an end at its tenth volume. The older journal, founded by Kemsies, *Zeitschrift für pädagogische Psychologie, Pathologie und Hygiene*, and Meumann's newer venture have combined, giving us a monthly journal under the joint editorship of Meumann & Scheibner—*Zeitschrift für päd. Psych. und experimentelle Pädagogik.* This junction of forces is surely all to the good, though the volumes of the *Experimentelle Pädagogik* will always remain a mine of good things. The new journal began in January last.

In response to a circular-letter from the Editor, the Principals of many of the Training Colleges have expressed their interest in work of a research character. It has been very properly pointed out that, even if it were possible, it would hardly be desirable to turn the Colleges into Research Institutions. They have immediate practical services to render to the community. In the course of that work, however, much may be done in the way of collecting materials and facts, if a definite principle for such collections could be decided upon. Thus psychologists owe an enormous debt to the alienist and his analyses of mental abnormalities. May not pedagogy look to the study of backward children, the comparative study of their school work, for similar help? This would require the systematic collection of material such as is at the disposal of every Training College in the country. Would the practical training of teachers suffer if work of that kind were going on?

As a matter of fact, every College in the country is making "experiments," in the sense that they are trying new things, but they are not usually ordered enough to make them scientific. A genuine experiment can be repeated; its conditions and its results are known. Steady and ordered work in a single direction is wanted.

Some Colleges have intimated their active interest in special problems. Thus, at Carmarthen, the staff is pursuing an inquiry into the origin and nature of the social consciousness of children, together with the nature of the education which would tend to its development, and on the historical side, materials are being garnered from the English Educational Literature of the eighteenth and nineteenth centuries with the object of systematizing the educational ideals of the period.

At the London Day Training College, question of the best colourings which produce the voluntary relief illusion of the map is being investigated, and experiments are being conducted to determine the possibility of producing mental "number schemes" which children may be taught to use systematically in their arithmetic. In addition, the staff is also busy with experimental inquiries into correlation schemes between mathematics and practical subjects, and into the curriculum of Standards II and III as a whole.

At the Normal College, Bangor, the bilingual problem is being systematically attacked from the English and from the Welsh side.

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EXPERIMENTAL TESTS OF HIGHER MENTAL PROCESSES AND THEIR RELATION TO GENERAL INTELLIGENCE.

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Aims and Methods of Mental Tests.

THERE are many problems, of social as well as scientific importance, which can be dealt with only by a national scheme of anthropometric surveys. How far teaching and training are as effective as birth, how far environment is as powerful as heredity, how far each generation is deteriorating or improving in intelligence or physique—these and many other questions, questions of education and sociology, as well as questions of psychology and anthropology, can satisfactorily be determined only by the collection of a vast array of facts. The facts in turn can only be collected by the periodic institution of a system of human measurements. Such a scheme of anthropometry would of necessity embrace mental capacities as well as bodily dimensions. Hence, for such purposes as these, we need a system of mental tests.

For the measurement of weight and height, of efficiency of vision and acuity of hearing, and of other physical and physiological characteristics, a standard scheme is already available. But the modes of testing mental capacities—attention, memory, reasoning, imagination, industry, emotion—are far from reliable or complete. Prolonged experiment is here required. Tests devised must themselves be tested. Methods must be standardized, results compared, before the measurements selected are extensively applied.[1]

Of all mental measurements, the one most urgently required is an index of the net resultant of an individual's mental abilities as a whole. Under the title "General Intelligence" this conception has already provoked many valuable investigations. Many more have yet to be made before such a measure can be attained. In these researches the co-operation of educationists, given so ungrudgingly in the past, will again be needed; for the school provides the most accessible and suitable material for such preliminary applications; and the schoolmaster's prior knowledge of the individuals tested provides the best criterion of the results.[2]

Since the ultimate aims of these experiments are so intimately connected with the welfare of the children of the future; and since children form, and have formed, the immediate objects of these investigations in the present and in the past, the results of the researches have a double interest for pedagogy. In the present article, therefore, I propose to illustrate one of the many lines of research now proceeding, by giving a non-technical account of the methods used and a preliminary report of the results obtained.

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[1] Details of a scheme of physical and mental measurements will be found in the final report of the Anthropometric Committee in the *Reports of the British Association for the Advancement of Science*, 1908, p. 351.

[2] I should here like to record my gratitude to the masters and mistresses of many Liverpool schools for the time, the trouble, and the interest they have bestowed in forwarding my own investigations and those of my research students upon this subject, more particularly to Mr. Bailey, Miss Keane, Miss Hardinge, and Miss Williams, of the Holt Secondary School; and to Miss Coates and Miss Lyon, of the Aigburth Vale Secondary School for Girls; and to Mr. R. C. Moore, of Wallasey Higher Elementary School.

The general procedure in such investigations is the following:—A group of children is chosen, usually all those falling within certain age limits at a selected school. They are examined, either in class or one by one, by means of experimental tests; and are arranged in order of proficiency for each. They are then arranged in order of intelligence, according to some independent empirical estimate, usually the deliberate opinion of their teachers or the results of their school examinations. The fewer the discrepancies between the order given by the test and the order given by the teacher, the better the test. To express the value of the test in this respect with mathematical precision, a figure can be calculated from the two orders called the *coefficient of correlation*. This is a fraction varying between 0 and 1, devised to measure the degree of concomitant variation between two variable quantities. If the order yielded by the test tallies exactly with the estimate furnished by the teacher, the correlation between them is expressed by 1; if there is no correspondence whatever between the two, the correlation is expressed by 0. Each test is carried out at least twice; and the coefficient of correlation between the two orders for the same test is called its *reliability coefficient*. By these statistical methods each test can itself be tested.

Results of a Previous Investigation.

By this procedure a series of intelligence tests, involving for their performance mental processes of varying grades of complexity, were compared in application to a number of children, aged 12½ to 13½, at a preparatory school and at an elementary school in Oxford. The methods and results of this investigation have been described in detail elsewhere.[1] Here only the main conclusions need be recalled, since those conclusions form the starting point of the further investigation I propose to describe at length.

Three important inferences were suggested.

(1). First, a comparison of all the coefficients of correlation with intelligence seemed to indicate that all the mental activities tested were pervaded, more or less, by a *single fundamental capacity*, forming, as it were, their greatest common measure. This universal ingredient, this "central factor," has been identified with "general intelligence."

(2). Secondly, a comparison of the average performances of the preparatory boys with those of the elementary boys showed that boys of superior intellectual parentage excel boys of ordinary parentage in precisely those tests which are most closely correlated with intelligence. Now there is evidence to show that, unlike scholastic examinations, these tests measure, not *acquired* capacity (such as knowledge imparted by memory or dexterities learnt through practice), but something *inborn*. From this it may be inferred that general intelligence, determining as it does the superiority of the tests, is itself inherited and innate.

These two inferences suggest and support the conception of a mental capacity at once inborn and at the same time unspecialized or all-pervading. They lead, I think, to a useful definition of that unstable and empirical term "general intelligence," namely, *inborn, all-round mental efficiency*.[1]

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[1] *British Journal of Psychology*. Vol. III., Pts. 1 and 2. A less technical account will be found in the *Journal for Child Study*. Vol. IV., Nos. 2 and 3.

(3). Previous investigators had used for the most part either simple motor tests (such as speed of dealing cards or tapping with a pencil), or simple sensory tests (such as the discrimination of two touches upon the skin or of minute differences of sound or weight). In the Oxford investigation other tests were also introduced, involving more complex activities, combining both sensory and motor processes. Besides tapping in the same spot, the children were required to tap on an irregular zigzag row of dots; besides dealing cards one after another, they were required to deal them into piles according to the colour of their backs—always, of course, under standard conditions secured by special apparatus or other necessary precautions. In other tests, processes of a higher order, such as memory, comparison, attention, were made the essential factors. The correlations showed that, roughly speaking, *the more complex the mental process involved and the higher the mental level tested, the more completely did the experimental results correspond with the empirical estimates of intelligence*.

It seemed clear, therefore, that the most profitable field for subsequent research lay in the direction of the higher mental levels and the more complex mental processes.

Objects of the Present Investigation.

In 1910 a further investigation was commenced at Liverpool. The primary object of these experiments was to elaborate tests of an even higher and more complex order than those previously used, which should yield yet larger correlations with intelligence than the largest yielded by the Oxford tests. By "higher" mental process I understand one which is dependent on and directly or indirectly involves other mental processes of a relatively simpler kind. The highest mental processes of all are those classed together under the term "reasoning." Tests involving reasoning had not before been applied; accordingly, it appeared of special importance to investigate these. Further, all the tests at Oxford had been carried out upon children of one sex only, falling between rather narrow age limits, by psychologists working in collaboration, and examining the children one by one, under conditions approximating more to those of the laboratory than to those of the school. I was, therefore, anxious to discover at the same time not only how far the tests were applicable to girls as well as boys, to younger children as well as older, but also with what success they could be carried out upon a number of children at once as well as upon single children, and by teachers untrained in psychological experiments as well as psychologists themselves.

These then were the aims of the experiments I propose to describe. The children who served as subjects belonged to two different schools. They were, first, all the children between 12½ and 13½ at the Aigburth Vale Secondary School for Girls; with these children, 30 in number, the tests used at the Oxford Schools were repeated both by myself and by a mistress; secondly, all the children between 11½ and 13½ at the Holt Secondary School for Boys and Girls; with these children, 60 to 75 in number, only the best of the earlier tests was repeated, and a new series was devised to include reasoning tests and class tests. The new tests were in each case tried first upon other children, including a particularly bright and a particularly stupid child, and also children particularly efficient in giving introspective accounts of their mental processes during the experiments.[1] By this means the experimental procedure was elaborated, corrected, and standardized before application to the selected groups. Introspections were taken from members of the selected groups as well, after the crucial experiments had been carried out.

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[1] Believing this definition to be of much importance to those concerned in work with children, I recently endeavoured to elaborate this conception in a non-technical fashion in *Child Study* (*loc. cit.*) It lends itself to interpretation in terms of neural structure, as a congenital tendency to organization in the portions of the brain congenitally unorganized; and, if we accept the broad view of attention and its physiological factors suggested by McDougall (*Mind*, N.S., Vol. x), seems to reconcile the two most suggestive accounts of general intelligence yet put forward—the view that intelligence means capacity for voluntary attention (Binet) and the view that it is a plastic function of the nervous system. Many psychologists, however, refuse to accept the hypothesis of a "central factor;" and even those who have suggested or accepted it might still refuse to identify it, or "general intelligence" with the more specific conception here intended. For this, as well as on other grounds, the term "general ability" might seem a preferable term to denote the conception above defined.

I shall describe the experiments carried out upon the larger group of children first, since these were concerned with the main problem—the relation of general ability and tests of reasoning. I shall describe very briefly the tests used, and the results obtained, and then indicate the main conclusion they support, and conclude with a statement of the answers to the secondary problems suggested by the results obtained both at this school and at the other.

The Tests Employed.

Most investigations upon the relations between mental abilities are characterized, I believe, by one serious defect. The tests selected are not selected upon any systematic plan. It is true that the conditions of experimentation at schools, and in particular of experimentation upon numbers of children at once, strictly limit the type of tests available. Yet even within these limits it is possible to build up tests related to one another according to some intelligible scheme, instead of adopting whatever happens to suit the accidental conditions of the research. The significance of the results of the total investigation would thereby be considerably enhanced.

The following tests were chosen with a view to comparing the various processes involved in written tests of reasoning. Speed of reading, speed of writing, speed of reproduction of associations, logical nature of associations reproduced, apprehension of problems, solution of problems, perception of relations in the concrete, perception of relations verbally expressed, combination of propositions into inferences, combination of inferences into arguments—these are some of the processes at which the following tests were directed. Other tests were added to contrast with these, and to relate the results of these to results obtained in previous researches. The introspections, however, frequently showed that the process actually tested was by no means invariably the same as the process for which the test was originally designed.

1. The Alphabet Test.—In the Oxford experiments the most successful test used was the Alphabet Test. The investigation, therefore, was resumed at Liverpool with the application of this test as a test of standard excellence, the criterion of the rest. The test consists in measuring with a stop-clock the number of seconds required to pick out, in order, one complete alphabet from two alphabets of cardboard letters, arranged in irregular array upon a prepared sheet. At the Holt School it gave a correlation of ·42 with the teachers' order for intelligence.[2]

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[1] I cannot omit to record my gratitude to these children, more particularly to Miss G. M. and Miss E. M. Smith for the trouble and pains they so willingly took, and for the useful hints and rich information they so willingly gave.

The preliminary and supplementary experiments carried out for the purpose of introspection I regard as perhaps the most interesting, the most valuable, and the most delicate portion of such investigations as the present. I much regret that it is impossible to cite at length some of the material thus obtained.

[2] This was a smaller correlation than those obtained at Oxford; but there the task of arranging the children in order of intelligence was much less difficult; for at the Holt School the children were more numerous, belonged to a larger number of different forms, comprised both sexes, and extended over a wider range of age.

The coefficients given have been calculated for the whole group according to the "Footrule" method. They are printed together for purposes of comparison in Table V. Coefficients have also been calculated for girls and boys separately. But the differences, though at times suggestive, are too slight to call for notice here.

2. Dividing Lines.—The essential element in all reasoning processes is, I suppose, the perception of relations. The simplest forms in which relations can be perceived are those presented by visual perceptions of relations in space. The bisection of lines had been used by other observers without giving very close correlations with intelligence. But it seemed possible that the division of lines into more difficult proportions might yield more satisfactory results.

Papers containing straight lines about 20 cm. in length were given to the children in class. They were required, first, to bisect a line : then, to put in a point of trisection ; from a third line they were to cut off a quarter of its total length ; a fourth they were to divide into two portions, bearing the same relation to each other as the two portions of a smaller line already divided—the actual proportion given in the pattern was 2 : 5. The first is little more than a simple sensory test. The other two, it was believed, would approximate in difficulty progressively to the last.

The results were not satisfactory. The reliability coefficients were low. From the introspections subsequently given it was clear that the form in which the experiment had been carried out had been seriously at fault ; in particular, the lines were too short. So far as the intelligence coefficients can be accepted, they lend some support to the original hypothesis. The figures are appreciably higher for the three more complicated exercises than for the exercises in mere bisection.

Several tests of a different nature, involving more complex processes than the bisection of lines, had been used by other workers for mass experiments. They had not been used in the Oxford experiments, since these were concerned solely with experiments upon individuals.

The more promising of these were now tried. They were :—

3. Erasure of Letters (O and E) from a page of capital letters printed in haphazard order, the papers being marked according to number correctly erased in a given time (two minutes).

4. Addition of simple sums ; and

5. Multiplication of simple sums—marked according to the number correctly worked in a given time (ten minutes each).

These gave better results than the division of lines ; but none superior to those of the Alphabet test.

6. Completion of Sense.—Of all the tests employed by previous investigators, perhaps the best known and most successful is the *Kombinations-methode* devised by the late Professor Ebbingham. This might be described as a "missing word" test. A piece of prose is given with certain words omitted and the child has to supply in the spaces left the words that best complete the meaning suggested by the context. There are two serious defects in the test as hitherto employed. First, the passages employed (usually fairy tales or historical anecdotes) seem calculated to call forth not so much reasoning or intelligence generally, as a peculiar form of constructive imagination, namely, the power of working and manipulating visual images of concrete scenes and situations ; secondly, in the usual method of marking the papers, the subjective opinion and impressions of the person evaluating the attempts have undue weight.

Before setting the crucial passages, therefore, prolonged experiments were made upon other children to discover a better plan for selecting and arranging the passages to be completed, and a better scheme for estimating the results. It seemed essential, in the first place, to select passages from the simpler English prose classics, so that both the meaning and its expression should be within the grasp of the children, and, at the same time, one word and one word only, namely, the word used by the author, should be exactly the right word, the *mot juste*, required to complete the sense. At the same time, it was necessary to avoid passages familiar to any of the children, either from their general reading or from their lessons in literature, as well as passages appealing only to the special interests of a few.

The passages finally chosen were Stevenson's fable *The Two Matches* and the first paragraph of Bacon's essay *On Revenge*. The omissions were arranged so that only one word would need to be inserted in each gap, and so that the insertions should be of graded difficulty, some being easy, to facilitate differentiation between the less intelligent children, others hard, to facilitate differentiation between the more intelligent. As much time was allowed as the children required (about ten minutes). In marking the papers, all the words used for each gap were tabulated into six classes, according to the degree to which they approximated to the word found in the original; and were assigned values from 0 to 5 accordingly. The variety of words used by the children is narrowly limited; and once the experiments have been carried out upon a large number of children the marking becomes mechanical. I find that the reliability coefficient for the same set of papers, marked independently by two different persons, according to this scheme rises to ·94; whereas, in ordinary school examinations, the reliability coefficient for the marking of the same set of examination papers by two independent examiners may be lower than ·6. The personal equation, therefore, which plays so large a part in ordinary marking, is for this test virtually eliminated.

The correlation of the two performances with one another is ·68. This is the nearest approach to a reliability coefficient for the test itself. The two papers set are not strictly comparable. One involves a story, the other an argument. As was intended, the argumentative test formed a distinctly different test to the narrative. This was evident from the introspections. The story was completed by means of mental pictures of the events described; the argument, by means of imageless thought, or, at least, thinking in which concrete or non-verbal imagery seemed to play no relevant part. The correlations with intelligence are ·48 and ·53 respectively. The argumentative test thus approximates to a test of intelligence more closely than the narrative.[1] It does not, it is true, appear to involve reasoning, so much as the power to follow the reasoning of others; but, so far as it goes, it confirms our initial hypothesis.

The remainder of the tests are, in their present connection, new. They deal with elements, essential or accessory, involved in the concrete processes of reasoning.

7. Speed of Writing.—In common with most of the following tests, and, indeed, with the majority available for mass-experiments, the foregoing test involved the process of writing. Writing, it might be thought, is a mere mechanical process of movement having no relation with intelligence; and thus an irrelevant element might be introduced impairing all those tests which involve writing, especially writing at maximum speed. To verify this possibility, therefore, the children were required to write continuously for five minutes a piece of prose which they all knew by heart. The only piece of prose which they all knew by heart was "The Lord's Prayer." This, therefore, they wrote over and over again at maximum speed. The number of letters written in the allotted time was taken as the measure required.

The reliability of this test proved to be extraordinarily high, nearly ·89. Further, it showed a correlation with intelligence as large as that yielded by the Alphabet test, namely, ·42. This was unexpected. Learning to write, however, is a complex sensori-motor process, involving "intelligence" in a well established sense of the word, namely, the acquirement of new dexterities by the process of trial and error; and it may be that speed of writing, even after the new dexterity has been acquired may, among children of the same age and of similar training, still remain as an index of the facility for acquisition.[2]

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[1] In case some critic complains that the difference is too small compared with the size of the "probable error" (which in a non-technical paper I refrain from discussing), I may add that the head master has recently furnished me with a revised order of intelligence for the children tested, and, though I have not yet been able to re-calculate the coefficients throughout, in the present case, the difference noted in the text is considerably enlarged by this revision.

[2] A similar test of speed of reading was intended, but not carried to completion. Mr. Moore very kindly allows me to cite figures obtained by him with a test of reading silently and aloud at another school. It will be seen that it resembles the test of writing both in the superior achievements of the girls and in the fairly high correlation with intelligence. cf. Table V.

8. Association of Words.—A test which has recently acquired notoriety in the psychological world is the Associative Reaction-time experiment. In this experiment a word (such as "black") is called out or shown to the subject, and he replies as quickly as possible with the first word that thereupon comes into his mind (such as "ink" or "white"). The time taken by him in reproducing this association is measured by a stop-watch or chronoscope, and the nature of the words reproduced is compared. These experiments have recently been used chiefly as emotional tests; suppressed or forgotten memories of highly-emotional experiences are, it has been maintained, the prime cause of hysteria, and in such cases the replies given and the time taken often reveal mental states that otherwise elude diagnosis. The process of mechanical association, however, also bears well-known relations, positive and negative, to the process of rational inference. Mechanical associations are determined not by reason, but by the accidents of past experience; yet they furnish the material on which reason is to work. It becomes important, therefore, in a comparative investigation of reasoning and its components in relation to intelligence, to include experiments on mechanical association in the series of tests employed. Hitherto, in work upon children, the interest in association experiments has centred rather in the nature of the associations and of the ideas and images evoked. Comparison with other tests has been omitted; correlation with intelligence has been determined by inspection or impression, not by statistical calculation. And the question of the relation of intelligence to the processes essentially involved in associative reactions has in consequence received conflicting replies.

The list of one hundred words commonly used by those who work with this test was printed in columns upon sheets of paper; other lists, more suited to children of school age, were also used. The sheets were distributed among the class face downwards. At a given signal the children turned the papers right side uppermost, and started writing down opposite each word, as quickly as they could, the first word that it suggested. At the end of 7½ minutes they were stopped. The number of words (or, in rare cases, phrases) written by each child in the given time was taken as the measurement of their speed of reproducing associations.

The reliability was high, ·81; the correlation with intelligence very low, ·13. The readiness to reproduce associated ideas may be indispensable to intelligent action and rational thought; but (we may infer) it constitutes no essential constituent in either, and for both would form a most inadequate index.

The words written by the children furnished an extraordinary insight into the contents of their minds, and into the associations suggested by given words. It is interesting, too, to note that the girls appeared far more fluent in this test than the boys.

An attempt was made to mark the quality as well as the number of associations, by determining the proportion of logical connections to accidental or "individual" associations. It was, however, vitiated by the subjective element inevitable in distinguishing *a priori* verbal associations from logical. Thus the association given by one child, "Goose—Gander," is apparently logical; but the reproduction may have been far more mechanical in this case than in the case of the association given by another child, "Goose—You are."

9. Solution of Questions.—In the world of business it is often said that the most efficient man is the man who can decide the greatest number of questions in the shortest possible time; and most forms of mental activity are instigated by the presence of situations which may be regarded as problems, practical or theoretical, demanding solution. These reflections suggested the next test. A list of one hundred questions was drawn up. The children were instructed to answer them as quickly as they could, writing opposite each question the single word its answer required. They were started and stopped as before. The time allowed was 7½ minutes. The number of questions answered was taken as the measurement required.

This test, it will be observed, approximates to the method adopted in setting an ordinary examination paper. It differs in two respects. First, the questions related to no special subject matter, but to the topics within the range of knowledge of all children of that age. "What would you like for a Christmas present?" "Does your mother keep a cat?"—such questions as these, unlike problems in arithmetic, depend on no acquired facility due to practice in specific mental operations; and unlike questions in history or geography, they depend on no accumulated knowledge due to memorization of specific facts. Secondly, the marking was determined purely by one criterion, namely, amount, regardless of accuracy. Commonly, quality has to be balanced against quantity, accuracy against amount. Here the questions were expressly framed so that it might reasonably be assumed that the answers were in every case correct. Incidentally the test showed clearly that such a method might be advantageously applied to obtain *questionnaire* returns on such subjects as children's preferences, interests and opinions. The peculiar or embarassing nature of an unusual question (such as "Do you think it is really wrong to play games on Sunday afternoon?" "Is your greatest friend a girl or a boy?") which might have caused suspicion or sophistication if encountered alone, is overlooked or forgotten when the question is embedded among ordinary topics of everyday life—("Do you cycle?" "What is the day of the week?")—and when it perforce is treated as one of a series to be worked through at maximum speed. Replies were written with a straightforwardness and candour which returns, confined exclusively to peculiar topics and answered at leisure, seldom display. In this way (I fancy) the views of children might safely be elicited upon problems to which it is not expedient explicitly to direct their attention, such as religion, home life, or sex.

The reliability coefficient was much the same as for the preceding test, namely, ·83; the correlation with intelligence was not quite so low, ·35. The reason for the low figure was disclosed in the cross-examination of the children picked for introspection. According to the account they gave of their mental processes in performing the test, the process at work in supplying the answers was not so much reasoned reflection as mechanical memory, a distinction familiar to those who set question-papers long before question-papers were exploited by the psychologist. The test, in fact, involved another series of associative reactions like the last, nearly as automatic, though rather more complex.

10. Completing Analogies.—Mechanical association, we have seen, or, as it is termed, "association by contiguity," has apparently but little relation to intelligence; "association by similars," however, is commonly contrasted with mechanical association by contiguity, as the essential basis of rational inference. Accordingly, a test involving this process was attemped. The test devised, however, involved something more than mere reproduction by similarity; it involved the perception, implicit or explicit, of a relation, and the reconstruction of an analogous one by so-called "relative suggestion." It may best be described as a series of problems in proportion or "rule of three," concrete ideas being used in place of numbers, words instead of figures. A hundred problems were printed in the following form :—

1. Eating : Drinking : : Hungry : .... ?
2. Paris : France : : London : .... ?

The children were instructed to supply a single word standing in the same relation to the third word as the second does to the first. The usual precautions were taken. The problems were framed so as to indicate unequivocally to the reasoner a single unambiguous word as its solution. Matter requiring specific knowledge was avoided. Blackboard instances explaining the task were given. A period of ten minutes was allowed. In marking, each correct answer counted 1, omissions or errors 0; in a few cases it was necessary to allow $\frac{2}{3}$ for good attempts and $\frac{1}{3}$ for poor attempts. The reliability coefficient of this test was peculiarly high, namely, ·92; the correlation with intelligence was also high, namely, ·52. The average performance of the girls was virtually equal to that of the boys, namely, 39·8 marks as compared with 39·3.

The test was also carried out upon the several children one by one, as well as upon the whole group assembled together in class. The problems were typewritten upon cards. Ladies' blank visiting cards were found admirable for the purpose. They are of a size that can easily be held within the child's hand, and of a smoothness which facilitates rapid dealing. By means of experiments upon other children of the same age, a series of fifty simple problems was obtained, from which all likely to cause errors had been eliminated. The child deals out the cards one by one, calling out the word required by the analogy as each printed problem is exposed. The time taken to deal the fifty cards is measured by a stop-clock. The pack of cards, the top card being a blank, forms a simple exposure apparatus, cheaper, and less alarming to young subjects than the costly instruments of the German laboratory ; the whole chain of "reactions" is timed instead of each reaction separately.

For the individual experiments, the reliability and intelligence coefficients are somewhat lower, namely, ·58 and ·50 respectively.

11. Formation of Sentences.—This test I owe to Mr. H. S. Lawson, Head Master of the Buxton College. His original suggestion was modified so as to form a test of the capacity for constructing, estimating, and expressing logical relations between two given terms. A list of ten words was drawn up. The children were required to combine each pair of words in a sentence expressing the *closest possible* connexion between the two ideas. (If the children are told merely to frame a sentence containing the two words given, the test is much harder to mark, and yields but poor coefficients of correlation.) Thus :—

1. Dog ... } Barking is the noise made by dogs.
2. Bark ... } Bottles have corks, and corks are made
3. Bottle ... of bark.

This test is not so reliable as the others (coefficient, ·61), but correlates more closely with intelligence than any of those yet mentioned (coefficient, ·62). Its defect is that, unless used with extreme discretion, the personal factor introduced in explaining the test and marking the sentences written is bound to disturb the final results.

12. Syllogisms.—The last of the verbal tests concerned the combination of sentences into brief arguments or inferences. A number of syllogisms were cyclostyled upon sheets. Premisses and conclusion were distinguished by arrangement, thus :—

One of the children in the class must get the prize.
I am one of the children in the class.
Therefore, I must get the prize.

Some of the inferences were sound, others fallacious ; none required technical knowledge of any specific subject matter. The children were required to indicate by marks those which they thought correct, and those which they thought incorrect. The number correctly marked was taken as a measure of proficiency at the test.

The reliability coefficient was low, ·48 ; the correlation with intelligence is also somewhat low, ·45. If, however, we allow for the unreliability of the method by "correction," the intelligence coefficient would become one of the highest of all. As the preliminary experiments showed, the "reliability" might be increased by altering the procedure, e.g., getting the child to complete an incomplete syllogism by adding the conclusion or supplying the middle term to the premisses ; but it was necessary to adopt the above procedure to obtain a form applicable also to experiments on the children individually.

Like the preceding test, the syllogisms were used for individual experiments as well as for group experiments. The procedure adopted was the same as before, namely, dealing prepared cards. The reliability coefficient was ·58 ; and the correlation with intelligence, ·51. The preliminary elimination of difficult cards was not completely successful. Accuracy, therefore, should perhaps be taken into account as well as speed. The correlation is then increased. As regards both speed and accuracy the girls are slightly, but insignificantly, superior to the boys.

The two remaining tests differed from all the others in one or other of two respects. First, they dealt with material other than words. Secondly, they concerned, not the perception, construction, or criticism of a single relation between two terms, or of a third relation between two other relations, but the synthetic apprehension of a number of relations within a complex whole.

13. Apprehension of Number.—The simplest cases of such a group of relations contained within a complex whole are those furnished by the numerical and geometrical relations of an aggregate of points in space. In a single glance, too brief for successive acts of attention to analyze the partial constituents of the total pattern a group of as many as five to eight dots can be correctly apprehended, the number varying according to the geometrical simplicity of the design. For this test, therefore, the cards were marked with small black spots. The spots, varying in number from four to nine and more, were arranged in various irregular patterns. The children were required to deal the cards, calling out as they went the number of the spots upon each. They were to deal as quickly as they could without making mistakes. The time taken to deal fifty was recorded with a stop-clock. The test was carried out upon the children individually alone.

The measurement obtained may roughly be said to indicate scope of synthetic attention ; for the larger the number of spots the child can apprehend at once the larger will be the number of cards which he can describe at a glance without stopping to count the component spots or groups of spots. Both reliability coefficient and correlation with intelligence were peculiarly high, namely, ·91 and ·64 respectively.

14. Reconstruction of Dissected Pictures.—As displayed in human life, intelligence may be regarded (at any rate under one of its aspects) as a progressive combination of the disordered and multitudinous fragments of experience into a unitary whole in accordance with a preconceived scheme. Now, avoiding the abstractness of numbers and space-relations on the one hand, and of words on the other, the simplest material for children to work with consists of pictures. If we endeavour to contrive a picture-test which shall demand the recombination of fragments into a whole, we arrive at something resembling the jig-saw puzzle. Tentative experiments with picture-postcard jig-saw puzzles (such as those published by Messrs. Raphael Tuck & Sons) and other similar apparatus suggested the precautions observed in the final experiments. Monochrome reproductions of paintings in postcard form were chosen, depicting subjects at once sufficiently complicated and sufficiently unitary to serve the purpose required. Those used for the experiments here described were reproductions of Wallis's *Death of Chatterton* and Botticelli's *Spring*.

An intact copy of the picture was fastened face downwards by a paper hinge upon the inside of the lid of a very shallow cardboard box. Upon the bottom of the box a rectangular space was ruled, the size of the picture-postcard, divided by lines into sixteen equal parts. The postcard to be pieced together was cut up into sixteen oblong pieces arranged in a pile, with a blank piece to cover them. The order of the pieces in every pile was the same for the same picture ; so that no child was handicapped by picking up a particularly easy or particularly difficult piece first. At a given signal the children turned the copy face upwards, and examined it carefully for half a minute. They were then told to turn it face downwards again, and to deal out the pieces as far as possible into their proper places, fitting them together till they were correct. The time taken was measured by a second-clock, started when the children started and allowed to run continuously. It was found possible to carry out this test upon groups as well as upon single individuals. For such class tests a somewhat elaborate arrangement was devised, involving at least two assistant supervisors to each room of thirty children to call out the times every two seconds and to take them down as each child finished. By this means it was found possible to obtain group-measurements in terms of time, instead of quality or amount, accurate to about four seconds.

The reliability of the group test thus carried out was ·90, unexpectedly high; its correlation with intelligence, ·72. The individual test, strange to say, gave less satisfactory results. Extending as it did over the greater portion of a school term, the application of this test individually doubtless caught the children under varying conditions of health and fatigue: and to these variations the unsatisfactoriness seems mainly due.

CONCLUSIONS.

A.—Main Problem: The Relation of Tests of Reasoning to Intelligence.

I pass from the description of the several tests and of their respective results to a consideration of the general inferences that may be drawn from the experiments surveyed as a whole.

First, let us consider whether the new "reasoning" tests prove better than the "complex" tests, as the complex tests in turn proved better than the older "simple" tests. Of the complex tests used at Oxford the Alphabet test was the best; this, therefore, becomes our criterion. Judged by this standard, Division of Lines, Erasure of Letters, Addition, Multiplication, Speed of Writing, Association of Words, Solution of Questions—these are all inferior tests. All yield correlations with intelligence smaller, or at least no larger, than that yielded by the Alphabet test. According to *a priori* considerations and introspective reports, none of these tests can be described as a test of reasoning or of active thought. But so far as the processes which they involve approximate to process of active thought and reasoning, to that extent do correlations roughly rise.[1] Counting Spots and Reconstructing Pictures, Completing Analogies, Completing a Story or an Argument and Connecting Words into Sentences—these yield correlations with intelligence distinctly greater than the Alphabet test, and their reliability coefficients (with one slight exception), are also at least as good. These are the superior tests. They fall into two sub-divisions. The last three involve essential elements of that complex mental activity described as logical inference. The other two—reconstructing pictures and counting spots—may be described (by those who like the word) as tests of Apperception. They seem to depend upon a complex synthetic activity, comparable to the activity often popularly described as intuition—the activity whereby we implicitly comprehend the essential meaning or character of the whole, without explicitly analyzing it into its component parts, or distinctly formulating their relations. The former may be loosely said to test the power of reasoning; the latter, the power of understanding; both, the power of thought. These five tests, then, are the best. Hence, we may conclude, that of the entire series of experiments, ranging as it does from the lowest levels of mental processes to the highest, *the tests of the power of thinking, that is, the power to understand or reason, are the best.*

Some qualification must be added. The pure and abstract thinker is not in consequence to be hailed as the most intelligent man. The most formal and most typical of the "reasoning" tests, the Syllogism test, actually gave the lowest coefficient of its group. The two highest coefficients were given by the two most concrete tests, Apprehension of Numbers, and Reconstruction of Pictures—tests which involved, as subordinate elements, quickness of vision and deftness of manipulation, as well as the recognition of relations, and were by no means tests of still and silent inner thought. It is true these finer differences in the coefficients have small validity; the larger differences between "reasoning" and "non-reasoning" tests alone carry weight. Yet if insignificant, they are still suggestive. And the suggestion they indicate is this: The best test of intelligence will be a test which involves not mere complexity of mental process on the one hand, nor yet mere loftiness of mental level on the other. It will be a test of a process so complex as to include mental functions of all levels in some degree, including the highest level of all. The component functions will be weighted according to their height upon the scale of mental development. The highest functions of all, those involved in reasoning, will accordingly be given the most weight. But they will not predominate to the exclusion of the rest.

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[1] The test of writing forms a curious exception. But we have seen above that it does not necessarily disprove the rule.

B.—Secondary Problems.

Tests, then, of the higher and more complex mental processes form the better tests of intelligence. Are they also more suitable for measurements upon a large scale?

For any test to be applicable to an extensive scheme, such as an anthropometric survey of school children, it is desirable upon practical grounds that it should fulfil at least four special conditions. First, it should be capable of application by teachers untrained to any considerable degree in a psychological laboratory. Secondly, it should be capable of application to large numbers of children at once. Thirdly, it should vary with social status only where social status varies with intelligence. Fourthly, only where sex varies with intelligence should it vary with sex. These conditions seem to be fulfilled by the higher and more complex tests far more satisfactorily than by the lower and more simple.

1. The Influence of the Experimenter's Training.

Protests have very properly been registered against the wholesale collection of unreliable data by an army of workers untrained in scientific methods. These protests apply, however, chiefly to psychological investigations which involve the use of technical instruments, and the evaluation of simple processes and subtle thresholds, under the varying conditions incidental to successive individual measurement. But in simultaneous group-experiments, dealing with processes more complex and more concrete, the teacher may perhaps prove as successful as the psychologist. For the teacher is far more practised in handling a large number of children at once with strict uniformity and fairness; and variations in fatigue, weather, personal influence, and so forth, variations which form a prime source of error in individual measurements, are then reduced to a minimum. Hence, it seems at least possible, that if measurements were carried out at different schools, upon the same day of the week, during the same school period, in the same portion of the term, the same season of the year, by teachers who had been through a course of experimental psychology and were themselves teachers of science, then the results obtained might be even more comparable with one another than if the measurements were carried out by a small body of experts, testing unknown children individually and therefore under varying conditions of fatigue—testing different schools successively and therefore during different portions of the term and different seasons of the year. This possibility seems in some measure verified by evidence such as the following.

I choose three tests for illustration: the "Æsthesiometer" test (a test of discrimination of two points upon the skin) as the best known "sensory" test; the "Alphabet," as a typical "higher" individual test; and the "Analogies" as a typical "higher" group test. The following are typical results:—

TABLE I.

	Correlation of Teacher's Results with Psychologist's.	Teacher's own Reliability Coefficient.	Psychologist's own Reliability Coefficient.
Æsthesiometer	·27	·43	·74
Alphabet	·63	·60	·65
Analogies	·73	·76	·92

In the case of the Alphabet and Analogies tests, the experiments yielding these tests were carried out by the teacher from typewritten instructions before ever meeting the psychologist; for the Æsthesiometer test, an actual demonstration was given. With tests of Pitch and Weight Discrimination the teacher is even less successful; with tests of Vision (Dr. Rivers' Line Board) and Movement (Dealing, Tapping) the difference is less marked. On the other hand, with tests that approximate in procedure to an examination paper—such as Addition, Multiplication, Completion of Arguments—the teacher's reliability coefficient is often higher than the psychologist's.

2. The Influence of the Conditions of Tests in Class.

Similar results are obtained upon comparing the results of simultaneous mass-tests with those carried out upon individual children, singly and in succession. It is obvious that simple tests of motor capacity, and of sensory discrimination (with a possible exception in the cases of vision and hearing), do not lend themselves to experiments upon groups; whereas the written tests or even the picture-puzzle tests can be carried out in class without much difficulty. The following results illustrate the great superiority in this respect of typical "higher" tests even over tests of vision or hearing.

TABLE II.

	Reliability Coefficient of Individual Test.	Reliability Coefficient of Group Test.	Correlation between Individual and Group Tests.
Bisection of Lines	·32	·15	·17
Discrimination of Sound	·67	·41	·39
Completion of Analogies	·58	·92	·53
Reconstruction of Postcards	·74	·90	·59

It is fair to add that experiments with the last two tests have not given such good results at other schools, but in no case has their group reliability fallen below ·5. But with the other test the reliability coefficients obtained in the mass experiments of other observers has been similarly low.[1]

On these grounds, therefore, I believe that tests of higher mental processes such as those described in this paper, are more amenable than the tests of the simpler processes to school investigation. This after all conforms with expectation. For the tests of the simplest functions are by no means the simplest tests.

3. The Influence of Social Status.

In comparing the experiments upon Elementary and Preparatory school-children of Oxford, I have shown[2] that the children of superior social status tend to be superior in their performance of the higher or more complex tests, while the children of less cultured parents occasionally excel in simpler tests; and I pointed out that, in the case of Touch-discrimination, this harmonized with the results of comparative investigations upon savage and civilized races.[3]

Here I will cite only the results of the two most reliable of the Oxford tests, the Æsthesiometer and the Alphabet, adding the results of measurements more recently obtained upon children of the worst Liverpool slums.

The figures for the Æsthesiometer test represent the smallest distance at which two points are distinguishable when touching the front of the forearm; the figures for the Alphabet test represent the time taken to pick out one alphabet from two irregularly-arranged sets of letters. In each case, therefore, the smaller the figure, the better the performance.

TABLE III.

	Æsthesiometer Test.	Alphabet Test.
Oxford Preparatory Boys	38.9 mm.	74 secs.
Oxford Elementary Boys	36·2 mm.	91 secs.
Liverpool Slum Boys	23·5 mm.	123 secs.

4. The Influence of Sex.

The question of innate mental differences between the sexes forms a matter upon which but little experimental research has hitherto been done. Psychologists that notice the subject confidently deny that any notable sex-differences have been snbstantiated. Compared with the overwhelming differences between individuals, it is said, and the unreliability of the methods used, the trivial sex-differences hitherto discovered sink into insignificance[4], and are, in the main, if not entirely, attributable to difference in environment, in experience and in training.[1] If differences between men and women apparent in everyday life have any foundation in actual differences of mental constitution, then these are to be sought, not among the lower processes, to which psychological tests are commonly confined, but on the higher levels (such as those of emotional susceptibility and intellectual endowment[2]) —levels left by current measurements almost untouched.

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[1] cf., C. Spearman, *American Journal of Psychology*, Vol. XV, p. 286.
W. Brown, *Use of Correlation in Psychology*, p. 48.

[2] *British Journal of Psychology*, l.c., p. 169 sq.

[3] *British Journal of Psychology*, l.c., p. 119. The relevant figures may also be found in Dr. C. S. Myers' *Introduction to Experimental Psychology* (Cambridge Shilling Manuals, 1911). Dr. Myers, however, adds a similar table for pitch discrimination; and in this case the differences vary not against, but with the differences in cultural status. I may add that the general reader who is interested in the whole subject of mental tests cannot do better than to refer to the last two chapters of his book.

[4] Thorndike, *Educational Psychology*. Chapter III. The Influence of Sex.

In order to obtain data for the other sex comparable with that obtained for boys at the Oxford Central School, I carried out a series of experiments in 1910-1911 at the Aigburth Vale Secondary School for Girls. At this school there happened to be precisely the same number of girls between the age limits required (12½ to 13½) as at the Oxford School, namely, thirty. The girls were slightly superior in social status to the Oxford boys, but (unlike the contrast with Preparatory School) the social superiority was the outcome of no clear difference in inheritable ability; it was too slight to disturb the measurements considerably, and worked in a direction opposite to the difference in the most conspicuously differentiating tests. For our purpose, therefore, the two schools are fairly comparable. The results of this test are given in Table IV.

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[1] Thompson, *Mental Traits of Sex*, esp. Chap. IX.

These are the only competent attempts systematically to survey the available experimental data with which I am acquainted. Anyone, however, who troubles to tabulate for himself the best established figures scattered through the pages of Dr. Whipple's *Manual of Mental and Physical Tests*, will find the contention advanced in the following paragraphs, on the whole astonishingly confirmed.

[2] J. Jastrow, art. *Sexual Characters*, Baldwin's *Dictionary of Philosophy and Psychology*.

TABLE IV.—**Oxford Tests: Sex Differences.**

TESTS.	Unit of Measurement.	Oxford Boys.	Liverpool Girls.	The Girls are
Æsthesiometer (Touch)	Smallest perceptible distance between two points in mm.	36·2	17·5	Very much more acute
Weight (Muscle sense)	Smallest perceptible difference in grms.	8·7	12·5	Much less acute
Pitch (Hearing)...	Smallest perceptible difference in vibrations	6·0	3·7	Much more acute
Lines (Vision) ...	Smallest perceptible difference in mm.	·4	[·3]	More acute (?)
Tapping	Number of taps executed in 15 seconds	80·5	79·2	If anything, slower
Card Dealing ...	Number of seconds to deal 50 cards	31·6	29·0	If anything, quicker
Card Sorting ...	Number of seconds to sort 50 cards	48·1	44·3	Quicker
Memory :—				
Nonsense ...	Marks for nonsense syllables correctly remembered	25·2	52·0	Very much better
Abstract ...	Marks for abstract nouns correctly remembered	49·1	76·0	Much better
Concrete ...	Marks for concrete nouns correctly remembered	60·7	87·5	Much better
Total ...	Marks for words correctly remembered	134·2	216	Much better
Mirror	Number of seconds for 6 tracings	388·9	[506]	Much slower (?)
	Coefficient of improvement	61%	62%	If anything, slower (?)
Spot Pattern ...	Number of exposures per pattern	45·3	[64·5]	Much slower (?)
Alphabet ...	Number of seconds to pick out 26 letters	91·0	68·5	Quicker

An amazing sex difference will at once be noticed in the averages for the first of the sensory tests. In discrimination of two points by touch, the girls are nearly twice as acute as the boys. This test is the oldest, the most notorious, and the most widely used of all. Yet its pronouncements are almost universally ignored. The most recent summary of its results (Dr. Whipple's *Manual of Mental and Physical Tests*)[1] merely emphasizes the negativity of Dr. Wissler's results, and the difficulties of Miss Thompson's methods, and cites no other authorities on the question. The following figures, therefore, I give in detail. They may serve to demonstrate the difference beyond dispute, and at the same time illustrate the vast importance of careful psychological measurement and thorough statistical evaluation in problems (so much discussed among the unstatistical and the non-psychological) of the mental differences between the sexes.

The mean threshold in millimetres was, at the boys' school, 36·20, (the probable error of the mean, 1·23); at the girls' school, 17·49, (probable error of mean, ·44)—a threshold nearly as sensitive as that of the most sensitive savages. The measurements at the two schools scarcely overlap at all. The only boy I have ever found to approximate in sensitivity to the girls was a boy aged 13, tested by myself and Mr.

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[1] Chapter VI, Test 23—The Æsthesiometric Index—p. 211.

Flügel (threshold, 10 mm.). This boy was a congenital idiot. The divergence between the schools cannot be assigned, even in part, to difference of status, for that should operate in the opposite direction. Nor can it be explained by the supposition that the boys and girls, though chronologically of the same age, were physiologically and developmentally of different ages; for this again should make the boys acuter, since girls are more precocious, and cutaneous acuity diminishes with maturity and age. Further, the same divergence is found among adults. Thus, among fifty university students, the mean threshold in millimetres for men is 49·08 mm. (range, 30·0 to 75·0, probable error of mean, 0·88); and for women, 27·75 (range, 12·5 to 32·5—the least sensitive woman is thus almost as acute as the most sensitive man; probable error of mean, 1.55; probable error of difference, 1·80). Nor is the difference acquired, due for instance to the thinner clothing worn upon the arms by women; for upon the face, cheek, and back of the neck, the same discrepancy is observed. Neither is it due entirely to the bias of the experimenter, for independent repetition of the tests by observers unacquainted with my own results yielded much the same averages for both the children and the adults. Similar differences, too, can usually be traced in previous investigations, though the difference (a question, after all, of only a few millimetres) is usually obscured by the acknowledged crudity of the older procedures. I will cite only one investigation—the most extensive known to me. On testing over twelve hundred subjects on the nape of the neck, Sir Francis Galton found that the mean threshold in mms. was, for men, 14·04 (range, 6 to 19; probable error of mean, 0·16); for women, 13·7 (range, 4 to 15; probable error of mean, 6·09). The difference is ·97; its probable error, ·19. The difference is thus nearly five times its probable error. The likelihood of so large a difference being due to errors of chance and sampling is scarcely one in a thousand.[1]

This difference at least, then, seems incontrovertible. Other sex-differences may be negligible; but in cutaneous discrimination, the validity of the striking sex-difference, shown by the children tested, seems established beyond dispute. Now this test is the only test of all which, in my experience, yields no appreciable correlation with intelligence. Among girls as well as boys, students as well as school children, the coefficient is always approximately zero. It may be regarded, therefore, as the lowest test of all. A large sex-difference is thus furnished by the lowest test.

In the rest of the earlier tests sex-differences are present, but not so marked. Compared with their probable errors, they are too small to make a detailed comparison profitable. Nevertheless, most of the differences between the boys and girls, which were not invalidated by differences of experimental procedure, have recurred in similar experiments upon students; and since they do not all follow the same direction, they cannot be all explained away by the difference in status or locality of the two schools. Those interested in the problem may find the details printed in the table suggestive.[1] Here, only the general tendency demands comment. The tests that yield correlations with intelligence, more intimate than the test of touch, but less intimate than the reasoning tests, uniformly disclose sex-differences smaller than the former test, but larger than the latter.

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[1] *Nature*, 1904, p. 40. The above "probable errors" are not worked out by Galton, but have been calculated, from the table of data given, by means of the usual formulæ. For the nature and significance of such formulæ the reader may refer to Dr. Sandiford's articles on *Measurement in Education* in this Journal.

Data for sex-differences in the higher tests are available from the experiments at the Mixed Secondary School (Table V); here the conditions for comparison were all that could be desired. The girls were distinctly poorer at Bisecting Lines and at Mechanical Arithmetic, and distinctly better at Erasures, at Speed of Reading and Writing, at Association of Words, and at Completing the Sense of a Story. But in the other cases, notably in the better tests of reasoning, there is little or no difference; the very slight superiority of the girls may perhaps be due to the slightly superior industry and conscientiousness on their part, or to a slightly greater interest in brief tests and trivial tasks on the part of the boys. Several boys thought the tests resembled drawing room pastimes more than the serious tasks of school. In any case, the differences are smaller than their probable error, and, therefore, not significant.[2]

So far as the experiments take us, the biggest difference (æsthesiometer) is found on the lowest levels; small but distinct differences are found upon slightly higher levels (alphabet, memory, sums); no significant differences are found on the highest level of all (reasoning). To say that the higher the mental process, the smaller the sex-difference it displays, would be to generalize too hastily from inadequate data, in a matter where, perhaps, no single generalization will ever cover the facts. But if we seek intelligence tests yielding data independent of innate differences due to sex, it seems probable that we may find them most readily upon the highest levels of mental life.

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[1] For those interested in sex-differences, the following points must be noted to obviate erroneous inferences. The tests of weight-, pitch-, and line-discrimination could not be applied to all the Aigburth girls. In the tests involving movement, the relations between the boys and girls are altered if the difference in social status is taken into account This may be done by amalgamating the preparatory boys' average with that of the Elementary boys before comparison with the girls'. If this is done the following figures are then obtained: Tapping, 87.8 taps (boys), 79.2 taps (girls); Dealing, 29.1″ (girls), 29.5″ (boys); Sorting, 44.7″ (boys), 44.3″ (girls). Thus, boys appear superior to girls in motor activity and muscle sense, and inferior in other senses. Where motor activity is complicate by sensory control, the divergencies neutralize each other, and the two sexes appear equal. The existence and nature of the remaining differences are unaffected by correction for social status. The only other important difference shown by this table is the well-known superior retentiveness of girls. The tests of mapping patterns of spots and of mirror drawing were carried out with different apparatus and under different conditions of illumination—differences that may perhaps explain in part or wholly the apparent inferiority of the girls. In the spot pattern women students appear very slightly inferior to men, while in mirror drawing females are usually said to superior (cf. Whipple, *l.c.*, p. 346); carried out by my own method, the figures obtained for mirror-tracing appear at first sight not quite consistent; thus, for Oxford students, the figures are, men, 125.3″; women (a group probably intellectually inferior to the men tested), 170.6″; for Oxford secondary school children (Milham Ford School), boys, 444.2″; girls, 263.4″. For these figures I am indebted to Miss Smith, Vice-Principal of Cherwall Hall, and Mr. Lodge, formerly of Brasenose College. For the other results I must repeat my gratitude to Miss Coates and those working under her at Aigburth School, for assisting me in the execution of the experiments upon the girls.

[2] There is an interesting difference in the reliability coefficients for the boys and for the girls. The average reliability was for the boys .64 (± .07), and for the girls .57 (± .08). This in itself is insignificant; but, taken in connexion with the fact that only in one test (erasures) were the girls appreciably more reliable than the boys, it is suggestive. The difference cannot, of course, be due to the method, since it was the same for both.

TABLE V.—**Liverpool Tests: Correlations and Sex-Differences.**

TEST.	Reliability Coefficent	Correlation with Intelligence.	Unit of Measurement.	Boys.	Girls.	Girls are.
Alphabet	·65	·42	Time taken in seconds ...	91·9	86·4	Slightly quicker.
Division of Lines:						
i. Cutting off one-half ...	·15	[·08]	Error in Centimetres	$\frac{3}{8}$	1	Less accurate.
ii. Cutting off one-third ..	·17	[·19]	Error in Centimetres	$3\frac{1}{2}$	$2\frac{1}{4}$	More accurate.
iii. Cutting off one-quarter	·32	·25	Error in Centimetres	5	$4\frac{7}{8}$	If anything, more accurate.
iv. Cutting off two-fifths ..	·32	[·21]	Error in Centimetres	$4\frac{1}{2}$	$4\frac{3}{8}$	If anything, more accurate.
Erasure of Letters	·75	·39	No. of Letters erased	99·5	110·5	Distinctly quicker.
Addition	[·50]	·25	No. of Figures correct ...	93·4	82·3	Distinctly slower.
Multiplication ...	[·55]	·41	,, ,,	216·2	204·2	,, ,,
Speed of Reading						
i. Reading aloud ...	—	·26	Time taken in minutes ...	[224·2]	[191·5]	Much quicker.
ii. Reading silently ...	—	·21	Time taken in minutes ...	[181·5]	[138·8]	,, ,,
Speed of Writing	·89	·42	No. of Letters written ...	974·5	1064·7]	Distinctly quicker.
Association of words	·81	·13	No. of Associations	83·9	93·8	,, ,,
Answering Questions	·83	·35	No. of Answers	80·5	87·8	Quicker.
Formation of Sentences ...	·61	·62	Marks for Quality	74	76·6	If anything, quicker.
Completion of Analogies:						
i. Group ...	·92	·52	No. of Answers	59·0	59·1	Practically equal.
ii. Individual...	[·58]	·50	Time taken in seconds ...	118·0	112·0	If anything, quicker
Completion of Sense:						
i. Story... ...	[·68]	·48	Marks for Quality	70·0	84·0	Distinctly better.
ii. Argument...		·53	,, ,,	50·4	53·2	Very slightly better.
Reconstruction of Pictures:						
i. Group ...	·90	[·72]	Time taken in minutes ...	5·1	4·6	Quicker.
ii. Individual...	·74	·46	,, ,,	12·6	12·3	If anything, quicker.
Syllogisms:						
Apprehension of Number ...	·91	·64	Time taken in seconds ...	122·9	111·0	Slightly better.
i. Group ...	[·48]	[·45]	No. of Errors ...	12·8	11·6	,, ,,
ii. Individual...	[·58]	·51	Time taken in seconds ...	247·2	234·8	Very slightly quicker.
			Errors	7·3	6·8	If anything, better.

NOTE ON TABLES IV AND V.—In the above figures the reader should allow for errors of measurement to the extent of at least 10 per cent. The coefficients of correlation here printed have been calculated for the mixed group, irrespective of sex, by Dr. Spearman's "Footrule" method, converting R into r by Professor Karl Pearson's table. For the sake of simplification in the separate coefficients for boys and girls, the probable errors in both coefficients and means have been omitted. They will be found cited in the text where their consideration seems important. The figures in brackets are questionable—the means, because the methods are either not quite reliable or not quite comparable; the reliability coefficients, because the tests were repeated with slightly different material; the intelligence coefficients, because of slight disagreements with coefficients computed by the "standard" method.

Our final conclusion, then, is as follows: *Of all the tests proposed, those involving higher mental processes, such as Reasoning, vary most closely with Intelligence, and are least vitiated by variations with irrelevant conditions, such as Sex, Social Status, Training of the experimenter, and Mass-measurement of numbers of children at once.*

The data on which this conclusion is based are doubtless highly inadequate. They are presented not as proofs of the inferences suggested, but rather as illustrations of the methods adopted and of the results to be anticipated from their use. Incidentally, the details may interest the educationist or prove suggestive to the teacher; and the whole may perhaps indicate the directions in which the work may best be forwarded by their co-operation or criticism, and the regions in which they may more profitably abstain. But the most instructive side of the research has yet to be mentioned. Those who venture to repeat the experiments for themselves will be astonished by two things: the detailed insight afforded into the defects of all tests in use, whether psychological or scholastic, and the numerous and novel sidelights thrown upon the mental processes and contents of the individual children examined. In such first-hand revelations, the tests of higher processes are peculiarly rich. Of all aspects of the work, this is perhaps the most fascinating. It is an aspect which can appear neither in the tables nor in the text. It is incommunicable. Only in the prosecution of actual experiments may such intimate glimpses be obtained

THE GENERAL PRINCIPLES OF HANDICRAFT INSTRUCTION.

By T. PERCY NUNN, M.A., D.Sc.

THE principles that determine the position of Handicraft work in the school have a two-fold theoretical basis. They rest (1) upon a general psychological theory; and (2) upon a general theory of the curriculum. It should, however, be observed that these two are not independent, since any theory of the curriculum must depend in large measure upon the psychological theories consciously or unconsciously held by those who frame it.

The most important feature of any psychological theory that can claim authority over the practice of the schools to-day is the conviction that all education is ultimately based upon certain natural or "instinctive" impulses in the child, and that it necessarily takes the form of an elaboration of those impulses along lines which—though they are largely determined by circumstances outside the control of the teacher—may to an important extent be deliberately fashioned by the efforts of the school. It is, moreover, vitally important to recognize that while the child's growth exhibits itself in the form of intellectual, of emotional, and of "motor" development, yet these three are to be regarded merely as aspects of the one process of elaboration of his native impulses. The recognition of the truth of this mode of regarding the child's development leads to the practical conclusion that the starting point of the educational process must be thc "sensori-motor re-action." By this maxim modern pedagogy replace the maxim—the inspiration of so much of the teaching reform of the last century—that the educational process starts from the child's sensations.

The position thus defined may be made clear by a simple example. A silver spoon first comes within an infant's area of vision about the time when he is "just beginning to take notice." To him the object is not yet a spoon, it is merely a brightness; but he is so organized that the perception of this brightness stimulates him to a comparatively complicated re-action, having two obviously distinguishable aspects. On the one hand there is a series of facial and other movements which the observer interprets as the "expression" of certain infantile emotions; on the other hand there is the initiation of a succession of grasping and carrying movements which do not cease until a certain end has been reached, namely, the accommodation of the spoon within the infant's mouth. This achievement implies progress in more than one direction. It has brought about the more effective integration of a number of elementary movements and adjustments of sense organs and limbs; it has converted the simple "brightness" into a "thing," seizable, movable, cold, hard, &c. If on a subsequent occasion the presence of the spoon prompts another impulsive process it cannot have the simplicity of the first; the stimulus will be a more complicated intellectual object, and will provoke a richer emotional re-action, and a more effective train of movements. In other words, the child's *education* has advanced a step, and advance has taken the form of an elaboration of the primitive instinctive impulse which is in this case called "curiosity." It is clear that the development of this same simple re-action might be traced along the three lines of cognition, emotion, and movement, until the stage is reached when (for example) the child is able to recognize the spoon as containing nauseous medicine to be conveyed to the mouth under direful penalties for spilling.

The formula here exemplified is one that can be employed throughout the range of human activities, though its application may become complicated as the type of the activities advances. Thus the astronomer who is scheming to settle the question whether Mars is or is not inhabited occupies a position which is merely the terminal stage of a long development that started, just as in the foregoing example, from a sensory appeal to the impulse of curiosity. But in the object that now stimulates the astronomer's efforts, the ruddy gleam in the dark sky—the original starting point of the whole process—is almost lost sight of in the concretion of meaning that has taken place around it; the emotions that sustain these efforts, though lineally descended from the primitive "how I wonder what you are," have become disciplined into the cool passion for scientific inquiry; while the motor element has developed into a highly-specialized power of technical manipulation.

But if in these respects the second example merely repeats at a higher level the features of the former, yet in other respects it exhibits an important difference. The child may gain inspiration for the "nice conduct" of his spoon from the observation of his elders, but the integration of intellectual and motor elements in which education in this article of good manners consists is a process that from start to finish occurs within the limits of his own individuality—his own nervous system and muscles must effect it. It is obvious that this does not hold equally good of the astronomer's efforts to pluck the heart out of the mystery of Mars. The integration of intellectual and motor elements which these efforts present is one that cannot exist within the limits of a single individual. Not only is it true that our astronomer has "reached the front" on the intellectual side of his problem not so much by repeating as by assimilating the results of the labours of his predecessors; it is also to be remembered that the manufacture of a telescope of unheard-of efficiency (which is the essence of the practical side of the problem) demands the convergence upon a single object of a range of technical powers too manifold and too specialized to be possessed by one man. Employing the terms made famous by Herbert Spencer we may say that the high degree of integration demanded by the problem of Mars—an integration of elements drawn from different provinces of knowledge and of technical skill—implies a correspondingly high degree of differentiation of the theoretical and practical efforts that are combined for its solution.

Before this point, then, our individual psychology has passed into social psychology. The special advantage of the route by which we have made the transition is that it enables us to trace so clearly the connexion between the two. All conscious life—animal and human—has its origin in the primitive phenomena of instinct, the distinctive human characteristic being the enormous internal development of which the instinctive impulses are capable, and their extraordinary power of combining into complicated synthetic systems. These "conative systems" in all important cases come eventually to embrace the intellectual and practical labours of many individuals. In this way are produced the great arts, the sciences, the political and other institutions in whose development the historic life of civilization consists.*

Upon these ideas we can, I believe with great profit, found our theory of the curriculum. Education consists, it has been seen, in the synthetic development of instinct with regard to its three co-ordinate factors of cognition, emotion and movement. The theory of the curriculum must determine the lines that this development shall follow. We shall derive our normative principles from the consideration that the history of the civilization of which the rising generation are the natural heirs is not merely a succession of events that have happened, but consists essentially of developed and systematized efforts springing from the common human instinctive impulses and following certain

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*The author's debt to Mr. McDougall's *Social Psychology* will be obvious.

specific lines of advance. The school curriculum should aim at leading its pupils so far along each of these great roads of human progress that they can obtain at least a sympathetic acquaintance with the main aspects of the race's age-long struggle and movement forwards. Upon this view, constructional work, art (in the narrower sense), literature and science must be present in every curriculum, since those names connote the cardinal directions in which humanity has reached and expressed its greatness. To these "subjects" we add history and geography as having the central function of exhibiting life to the pupil as a constant movement and endeavour towards worthy ends—history teaching him the solidarity of the present phase of the human movement with its past phases, geography teaching the essential unity and interdependence of human efforts under varying conditions of climate and place.

But when we have decided what are to be the staple subjects of our curriculum, and that we are to present them to our children as the great aspects of historic human endeavour, our theory is not yet complete. The educated man should be, through sympathetic knowledge, in touch with all the main branches of human activity, but his own life-work will, as a rule, he confined to one of them. In other words, in the adult, knowledge, emotion and practical skill will be systematized for the attainment of a specific class of ends, and his school has not done all it might have done for him if it has not shaped his progress along the lines of the curriculum so as to lead him steadily and continuously to the position from which his adult life is to start. That is to say, the ideal curriculum would be one in which, as the leaving age approaches, the common subjects of instruction are thrown, for a boy who is to be a naval or military officer, a lawyer, a doctor, a commercial man, a cabinet-maker, a builder, or a motor-car engineer, into a form of synthesis which is continuous with the form of synthesis of his activities in the profession or trade of his choice. In each of these forms of synthesis a certain group of subjects will occupy the central position, these being, of course, the subjects most directly connected with the adult activities in each case. The other subjects will be so treated as to bring out the relation of this particular form of life-work to the whole body of human activities, a function to which the term "cultural" may perhaps be applied with more appropriateness than to any specific subject of the curriculum. It is very important to note that this scheme does not imply an attempt to teach in school what should be reserved for the camp, the hospital, or the workshop. The actual adult activities in store for a given boy or girl will, in general, represent a degree both of integration and of differentiation beyond that appropriate to the school age. But it does imply a progressive integration and differentiation of effort in the case of each pupil which shall lead continuously to the degree of specialization characteristic of the adult activities.

The educationist who is called upon to justify the inclusion of a given subject in the school curriculum at one time defends it on the ground of its usefulness, at another on the ground of its value as a "discipline," while in yet another case he argues that the subject represents one of the human perfections which each of us should realize in himself if he has the ability. It is obvious that each of these theories of the curriculum (for that is what they are) is capable of only partial application. It may be claimed, perhaps, of the theory described above in broadest outline that it includes and gives its proper place to each of the other three. The possibility of its universal application in practice raises, no doubt, questions of extreme difficulty. Fortunately this paper is not concerned with these, and may turn aside from them to consider the much more limited question of its application, together with our general psychological theory, to the treatment of Handicraft subjects in the school.

If the foregoing arguments are well-founded, Handicraft will enter into the curriculum of every school in two capacities—in a *substantive* and in an *instrumental* capacity. (A subject may be called "substantive" if it is taught for its own sake, as is literature or history; it may be called "instrumental" if it is taught for the sake of its applications to some other subject, as grammar is now taught to aid the appreciaiion of literature, and as geography was formerly taught to elucidate history). In its substantive capacity the subject of Handicraft will seek to develop certain instinctive impulses of the pupil along the line which leads to the power of beautiful and of useful construction, and should take him at least so far along that line as to give him a sympathetic understanding of this particular one of the great departments of human activity. In its instrumental capacity Handicraft will play a subordinate but yet important part in the development of various forms of predominantly intellectual activity which fall within the scope of other subjects of the curriculum.

It is, then, the essential requirement of "substantive" Handicraft instruction that while it constantly carries forward the co-ordinated development of knowledge and skill which our general psychological theory demands, it shall also constantly give occasion for the satisfaction which comes from the successful adaptation of means to genuinely desired ends, and for the joy of mastery over tools and material which is so important to the education of the sense of beauty. In virtue of this latter element it is clear that this work is closely allied to Art training. At the same time it affords numerous points of departure for studies of an instrumental kind, such as the calculation of areas and other geometrical topics, and also points for application of knowledge acquired in other fields.

On the other hand the introduction of the Handicraft element into other subjects of the curriculum should be regulated by the general principle, derived from psychology, that the so-called "sciences" are not purely intellectual structures, but are syntheses of intellectual with motor elements, unified by their connexion with definite emotional elements and their derivation from definite instinctive origins. The ideal in this part of the work is, therefore, to produce as complete fusion between the intellectual and the motor aspects of the subjects of study as possible. Three grades in the degree of this fusion may be distinguished, and it will be seen that they occur (roughly) in successive stages of the pupil's general development.

Thus, in "Nature Study" we have as important incidental constructions, the making of nets to catch specimens, of belts and pouches to bring the specimens home, the mending, strengthening and decoration of boxes for roof or window gardens, &c. These constructional exercises are extraneous to the actual observing and thinking work involved in Nature Study, but they play the essential part of bringing the whole subject as near to reality as possible. Next, in such subjects as geography, the constructon of models in clay, sand and other materials illustrative of inaccessible scenes, the making of relief models of progressive degrees of accuracy, and other similar exercises have well-recognized value in the development of the intellectual side of the subject, though they are not absolutely essential to it. Finally, in the physical sciences the fusion between the intellectual and manipulative elements is, or should be, most complete. If the pursuit of these subjects in the school is in any sense to reproduce the natural conditions of the growth of the sciences, great importance must be attached to the devising and construction of apparatus by the pupils, unaided or in collaboration with the teacher; and, above all, to the incidental constructions and manipulations of material which an actual investigation almost always involves. Deprived of the constructional element the science course is too often deprived of everything that makes it vital and real to the pupil.

Finally, it must not be forgotten that in accordance with our theory of curriculum some form or forms of Handicraft will, towards the close of the school age, constitute the central subject-matter of instruction in the case of pupils who propose to follow certain walks in life. To what has already been said above on this matter it would be unsuitable to add anything in a paper which deals only with the broadest principles which should regulate instruction in Handicraft.

SOCIAL CLASS AND MENTAL PROFICIENCY IN ELEMENTARY SCHOOL CHILDREN (II).

By W. H. WINCH.

IV.—Second Investigation.—School "C.O."

A second investigation was made in the spring of 1907. It was carried out, as in the previous case, in a municipal boys' school. The neighbourhood was so mixed in character that the Head Master thought that his boys fell into three distinct social classes rather than into two. Approaching the school from the nearest main road, a visitor would suppose that he was about to enter a rather good neighbourhood; but a more complete survey of the district shows how variable residentially it really is. In fact, one of the roads which supplies children to this school was marked "black" in Booth's "Life and Labour in London," and, according to the Head Master, well deserves its mark.

The general method of division into social classes was the same as in the previous investigation. The expression "social class" may seem absurd to some, especially to those who do not know the poor "at home." But the reader may rest assured that our "Board Schools," and often the same schools, are attended by children whose parents never meet each other, would not speak to each other if they did, and who do not deal at shops of the same standing. A rather pathetic ideal of parents of the better class is "to keep themselves to themselves," by which it is implied that neither they nor their children should make acquaintances they may be ashamed of; whilst even the lowest type of all do not interfere with "respectable" people except in as far as they may become a nuisance owing to alcoholic excess—an influence under which even university undergraduates have been known to enter into unusual social relationships.

Children were placed in Class A who came from homes where the rental was from £42 a year, not inclusive of rates, down to 11/- per week inclusive. Those who came from homes with a rental of 11/- to 7/- a week, inclusive of rates, were placed in Class B; whilst Class C consisted of those from houses or tenements of less than 7/- a week. In many cases the *houses* from which these children came were dearer but were much sub-let. There were children in this class coming from families living in one room at a rental of 3/6 a week.

The marks for Mental Proficiency were taken from the School Record Book; and were the marks obtained by the children in all the subjects of the School Terminal Examination of Christmas, 1906.

A further relevant point is the *pitch* of the Head Master's Examination. A study of the questions showed that, as a rule, the average boy—that disembodied but useful entity—had a very good chance of doing well; in a few cases only did it appear that the questions were too difficult.

With these preliminary explanations the summarized table should be intelligible.

TABLE V, showing the work of the Class A, Class B, and Class C children compared, subject by subject, and standard by standard.

Standard.	Class A, B, or C.	No. of Children.	Av. Age on 31/7/07.		AVERAGE MARK FOR									
			Yrs.	Mths.	Reading	Hand-Writing	Spelling	Arithmetic.	Drawing.	Manual Training.	English Composition	English Grammar.	History	Science
I	A	3	9	0	8·3	7·3	10·0	7·5	5·6					
	B	28	8	2	6·3	6·9	8·6	6·5	6·4					
	C	10	8	10	6·6	6·8	8·9	6·4	6·0					
II	A	17	9	5	8·0	7·0	8·1	6·3	5·4					
	B	29	9	0	7·5	7·1	8·2	5·8	6·3					
	C	15	10	7	6·5	7·0	9·2	5·1	5·9					
III	A	10	10	3	6·8	6·3	7·2	6·8	7·0		6·8			
	B	48	10	2	7·0	6·6	7·7	7·3	7·4		7·1			
	C	9	10	10	6·6	6·6	7·2	7·8	7·1		6·7			
IV	A	10	11	2	8·1	7·3	6·4	6·2	6·3		6·6			
	B	46	11	3	7·3	7·6	7·4	6·4	6·8		6·3			
	C	9	12	1	6·0	7·1	6·6	7·1	7·3		5·1			
VB	A	10	12	5	7·3	7·3	4·7	2·9	7·6	7·3	6·0			
	B	35	11	10	7·4	7·0	4·8	4·6	6·5	7·0	6·4			
	C	6	12	9	6·8	7·3	5·6	5·1	7·5	7·2	5·6			
VA	A	9	12	8	7·1	6·7	4·1	4·0	7·8	8·2	5·8			
	B	31	12	1	8·3	7·0	4·5	5·0	6·8	7·3	6·4			
	C	6	12	4	7·5	5·8	7·0	5·3	6·6	7·5	3·5			
VI	A	16	12	10	7·7	7·3	6·8	5·7	6·2	7·8	5·8	7·5	7·0	7·0
	B	39	12	10	7·0	7·4	6·0	6·3	6·1	7·6	6·1	7·3	6·4	6·4
	C	3	13	6	7·3	7·3	7·0	3·3	6·6	7·0	5·3	7·0	6·3	6·3
VII	A	9	13	8	6·5	7·7	5·2	5·3	7·2	8·0	7·2	6·0	7·2	7·2
	B	15	13	8	7·5	7·7	5·4	5·6	6·3	8·3	7·2	6·0	7·0	7·0
	C	4	12	11	7·0	7·7	6·7	3·0	5·7	8·2	6·5	5·5	6·5	6·7

Nine of the abler and younger boys had been drafted off to Higher Grade and Secondary Schools in 1906. This annual promotion to other schools weakens the results in the higher standards in Classes A and B as compared with Class C. All these boys, for example, were from Class A or Class B; indeed, the annual draft consists almost exclusively of the socially superior boys.

The general relation between the work of Classes A, B, and C is more comprehensively shown in the following table:—

TABLE VI, showing the average marks for Class A, Class B, and Class C, all standards taken together.

Class.	No. of Children.	AVERAGE MARK FOR									
		Reading	Hand-Writing	Spelling	Arithmetic.	Drawing-	Manual Training.	English Composition	English Grammar.	History	Science
A	84	7·5	7·1	6·5	5·6	6·6	7·8	6·3	7·0	7·0	7·1
B	271	7·2	7·1	6·7	6·0	6·6	7·4	6·5	6·9	6·5	6·6
C	62	6·6	6·9	7·1	5·7	6·5	7·5	5·5	6·1	6·4	6·5

Though the figures for this school did not seem so likely, as in School "L.A," at least in a similar degree, to bear different values in different standards owing to the different *pitch* of the examinations in the same subject in different standards, or the different pedagogic powers of the teachers; yet there seemed cases where, from an inspection of the questions and the marks, some error seemed likely to arise on these grounds. Consequently, as before, the marks for each subject per standard were reduced to 100 as a basis; the actual marks obtained by the A boys, B boys, and C boys for each subject in each standard were considered to be 100, and this 100 was divided up between average A, B, and C boys in proportion to the marks actually obtained.

TABLE VII, showing, for each subject and standard, the proportionate distribution of marks between average boys of Class A, Class B, and Class C.

Standard.	Class.	No. of Children.	Av. Age on 31/7/07.		AVERAGE MARK FOR									
			Yrs.	Mths.	Reading	Hand-Writing	Spelling	Arithmetic.	Drawing.	Manual Training.	English Composition	English Grammar.	History	Science
I	A	3	9	0	39·2	34·8	36·3	36·8	31·1					
	B	28	8	2	29·7	32·8	31·4	31·8	35·6					
	C	10	8	10	31·1	32·4	32·3	31·4	33·3					
II	A	17	9	5	36·3	33·4	31·7	36·6	30·7					
	B	29	9	0	34·1	33·6	32·2	33·7	35·8					
	C	15	10	7	29·6	33·4	36·1	29·7	33·5					
III	A	10	10	3	33·3	32·4	32·6	31·1	32·6		33·0			
	B	48	10	2	34·3	33·8	34·8	33·3	34·4		34·5			
	C	9	10	10	32·4	33·8	32·6	35·6	33·0		32·5			
IV	A	10	11	2	37·9	33·2	31·4	31·5	30·8		36·7			
	B	46	11	3	34·1	34·5	36·2	32·5	33·4		35·0			
	C	9	12	1	28·0	32·3	32·4	36·0	35·8		28·3			
VB	A	10	12	5	34·0	33·8	31·1	23·0	35·2	33·9	33·3			
	B	35	11	10	34·4	32·4	31·8	36·5	30·1	32·6	35·5			
	C	6	12	9	31·6	33·8	37·1	40·5	34·7	33·5	31·2			
VA	A	9	12	8	31·0	34·4	26·3	28·0	36·5	35·6	36·9			
	B	31	12	1	36·2	35·9	28·8	35·0	32·5	31·7	40·8			
	C	6	12	4	32·8	29·7	44·9	37·0	31·0	32·6	22·3			
VI	A	16	12	10	35·0	33·2	34·4	37·2	32·4	34·8	33·7	34·4	35·5	35·5
	B	39	12	10	31·8	33·6	30·3	41·2	32·4	33·9	35·5	33·5	32·5	32·5
	C	3	13	6	33·2	33·2	35·3	21·6	35·2	31·3	30·8	32·1	32·0	32·0
VII	A	9	13	8	31·0	33·3	30·1	38·1	37·5	32·6	34·4	34·3	34·8	34·4
	B	15	13	8	35·7	33·3	31·2	40·3	32·8	33·9	34·4	34·3	33·8	33·5
	C	4	12	11	33·3	33·3	38·7	21·6	29·7	33·5	31·1	31·4	31·4	32·1

If we scrutinize either Table VI or Table VII, it seems clear that there is no general intellectual difference between the boys of Class A and those of Class B; whilst the children of Class C, with one exception, are usually found below the children of Class A and Class B.

The one subject in which Class C is first is spelling. This is in striking contrast to the results in the preceding school. It may be explained by the fact that a large proportion of Class C boys in certain classes were repeating their "standard" work for the second time. In Hand-Writing, Drawing, and Manual Training (Woodwork) the children of Classes A, B, and C are practically equal. In Reading, English Composition, and English Grammar, the boys of the socially superior classes are distinctly above the children of Class C, whilst in Arithmetic the differences are not so marked, possibly from the repetition of the "standard" work indicated above.

With the exception of those in Spelling, the results are, on the whole, consilient with those of the preceding school. The lower class children, if educated along lines in which they are relatively strongest, would probably profit by a more manual type of education.

But so far, in comparing the work of Classes A, B, and C in this school, I have omitted to consider the question of age. After all, if a Head Master has classified his boys properly on a general intellectual basis, they should tend to be approximately equal in every standard; or, speaking more exactly, the Classes A, B, and C, should tend to be approximately equal. In order that we may consider the progress of all the pupils in Classes A, B, and C, and compare them, it is necessary to adopt a system of progress marks.* Every child who entered his present class at the proper age, as determined by the rules of the Local Authority, which result in a kind of normative rate of progress for the ordinary child, was credited with 24 marks. If he entered earlier than this normative age, an additional mark was given for every month in advance. If he entered later, one mark was subtracted for every month in excess of the normative age. Thus, John Brown enters Standard I at 8 years of age; the normative age is 6 yrs. 6 mths. for entry into Standard I; his progress mark is therefore 24 − 18 = 6. Alfred Smith enters Standard V at the age of 9 yrs. 6 mths.; the normative age is 10 yrs. 6 mths.; so that his progress mark is 24 + 12 = 36. To each child a mark for progress was assigned in this way, and the marks collected and averaged thus:

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* For further explanation and use of "progress marks," see "When should a Child begin School," pp. 9, 10, 11 (Educational Psychology Monographs).

TABLE VIII, showing the progress marks of Classes A, B, and C compared, standard by standard.

Standard.	Class.	No. of Children.	Average Age *on 31/7/07.		Average Progress Marks.
			Yrs.	Mths.	
I	A	3	9	0	6
	B	28	8	2	16
	C	10	8	10	8
II	A	17	9	5	13
	B	29	9	0	18
	C	15	10	7	—1
III	A	10	10	3	15
	B	48	10	2	16
	C	9	10	10	8
IV	A	10	11	2	16
	B	46	11	3	15
	C	9	12	1	5
VB	A	10	12	5	13
	B	35	11	10	20
	B	6	12	9	9
VA	A	9	12	8	10
	B	31	12	1	17
	C	6	12	4	14
VI	A	16	12	10	20
	B	39	12	10	20
	C	3	13	6	12
VII	A	9	13	8	22
	B	15	13	8	22
	C	4	12	11	31
Totals...	A's	**84**			**15·3**
	B's	**271**			**17·5**
	C's	**62**			**7·7**

*The ages in this column are those at the end of the school year.

An inspection of Table VIII shows Class B to have made the most progress. Class A is some two months behind Class B, and Class C is 10 months behind Class B. Referring at the same time to Tables VI and VII, we see that, not only are the boys of Class C much lower in the school for their age than the boys of Classes A and B, but, even within the classes in which they are placed, they usually do inferior work. The differences in examination results would have been greater than this were it not that the *pitch* of the examination was somewhat lower in this than in the previous school. Class A has not done quite so well as Class B; their examination marks are identical as to totals, but they are not quite so advanced for their ages. The Head Master explains this by stating that several of the boys had previously attended private schools, and had entered his school badly prepared at a comparatively late age. Doubtless this condition operated, but I feel very far from sure that it explained the whole extent of the difference between A and B. I leave this point for further determination; but I suggest that these boys may come from families who normally would have sent their children to secondary schools, but were prevented by poverty. They have economized in education rather than in house rent. They form a relatively unsuccessful stratum of a secondary rather than a primary school type.

V.—Third Investigation.—School "E.N."

The third investigation was carried out in a school in which the children attending were very homogeneous in social class. There were large houses and small houses in the neighbourhood, and a casual visitor would have been disposed to think that the school children who came from the large houses, which were well built and of good appearance, must be much superior in social class to those who came from the small houses. Some of the large houses were let at a rental of £45 a year (exclusive of rates and taxes), but they were almost invariably divided into sets of apartments. Even then the people who lived in them were not among the poorest. The smaller houses were also sub-divided, usually between two families. There was no house in the neighbourhood at less than 11/6 a week (inclusive of rates); and very few of these, or of those at 12/6 and 13/6, were inhabited by one family.

The general plan of dividing the boys into Class A and Class B in accordance with the rental paid by their families, which had been adopted in the preceding investigations, was also carried out in this case. All the houses from 18/- a week (including rates) to £45 a year (exclusive of rates) were placed in Class A. All the houses from 11/6 to 17/6 a week were placed in Class B.

We divided on this basis, with valuable assistance from the School Attendance Officer.

Single families in the large houses were unknown, and were very rare indeed in the small houses; but there were a few such cases. Such persons in a neighbourhood like this would usually be socially superior to those living in parts of houses. On the principle of the division in this school, these children are placed in Class B. This is contrary to the idea of the classification; but, notwithstanding this point, which I discovered when it was too late to rectify it, there is no doubt that the Class A children are better housed, with these few exceptions, than the Class B children. It is, of course, part of the general contention that it was difficult to divide the social classes attending this school on a basis of rental; indeed more, namely, that the children were very homogeneous socially; but it is admitted that, in the case of the few families occupying the whole of a small house, a mistake in classification has been made.

The Head Master's examinations were searching, thorough, and carefully administered. It is not due to the low pitch of the examination that the figures for Class A and Class B approximate so closely in this school.

The investigation was commenced in November, 1906. The marks on which the educational attainments of the pupils were estimated were those of the final examination of the school year 1905-1906, which had taken place in July previous, when it was not known that any such investigation would be made.

TABLE IX, showing the actual marks for boys of Class A and Class B compared, subject by subject, and standard by standard.

Standard.	Class A or B.	No. of Children.	Av. Age on 31/7/06. Yrs.	Mths.	AVERAGE MARK FOR Reading Max. 20	Spelling Max. 20	Arithmetic. Max. 20	Drawing. Max. 10	Composition Max. 20	Manual Training. Max. 15	Mental Arithmetic. Max. 20
I	A	4	8	11	10·2	14·2	15·2	2·2	7·2		
	B	22	8	10	11·1	12·3	14·9	2·8	6·7		
II	A	20	9	5	13·0	9·8	16·0	6·6	5·7		16·0
	B	28	9	4	13·6	10·1	17·3	5·7	5·3		17·2
III	A	13	10	7	13·0	17·1	18·6	4·6	10·6		18·7
	B	41	10	5	12·1	16·6	15·0	3·6	9·6		17·2
IV	A	16	11	2	15·0	16·3	17·7	5·8	11·2		19·1
	B	34	11	5	14·0	15·9	17·2	6·1	11·2		18·2
V	A	10	12	4	13·9	15·8	13·5	6·5	12·7	8·5	16·5
	B	30	12	4	14·2	17·7	12·3	6·6	13·7	8·3	16·6
VI	A	7	13	0	13·4	15·5	19·1	5·5	15·2	9·4	15·7
	B	23	13	0	13·9	17·7	16·5	5·9	16·2	9·0	16·2
VII	A	2	13	3	16·0	19·5	19·5	9·5	18·0	9·5	18·5
	B	6	13	8	17·0	17·5	19·0	8·0	19·0	10·3	18·5

Four Class A boys had left this school when over 11 years of age for schools of higher type during the last four years.

An inspection of the table above shows a few cases in which the marking seems doubtful. Standard I boys were not especially deficient in the power to draw, though the marks given look as if they were; the low marks were assigned because the Head Master thought the teaching had been bad. Nor were the children of Standard II, considering their age, as inferior to the children of other standards in Spelling and English Composition as their mark suggests.

It was thought fairer, as before, to suppose that the standards were approximately equal in their work, having regard, of course, to what may be properly required of them. The average A boy and the average B boy in each standard were together accredited with 100 marks in each subject; and the 100 marks were apportioned between them in accordance with the marks actually gained. The marks thus corrected for inequalities of examination and marking are given in the following table:—

TABLE X, showing the average marks per boy throughout the school, corrected for inequalities due to the varying nature of the tests.

Standard.	Class A or B.	No. of Children.	Av. Age on 31/7/06.		Average Mark for all subjects	AVERAGE MARK FOR						
			Yrs.	Mths.		Reading	Spelling	Arithmetic.	Drawing.	Composition	Manual Training.	Mental Arithmetic.
I	A	4	8	11	49·6	47·8	53·5	50·8	44·0	51·7		
	B	22	8	10	50·4	52·2	46·5	49·2	56·0	48·3		
II	A	20	9	5	49·9	48·8	49·2	48·0	53·6	51·8		48·1
	B	28	9	4	50·1	51·2	50·8	52·0	46·4	48·2		51·9
III	A	13	10	7	53·0	51·7	50·7	55·3	56·0	52·4		52·1
	B	41	10	5	47·0	48·3	49·3	44·7	44·0	47·6		47·9
IV	A	16	11	2	50·5	51·7	50·6	50·7	48·7	50·0		51·4
	B	34	11	5	49·5	48·3	49·4	49·3	51·3	50·0		48·6
V	A	10	12	4	49·5	49·4	47·1	52·3	49·6	48·1	50·5	49·8
	B	30	12	4	50·5	50·6	52·9	47·7	50·4	51·9	49·5	50·2
VI	A	7	13	0	49·4	49·0	46·6	53·6	48·2	48·4	51·0	49·2
	B	23	13	0	50·6	51·0	53·4	46·4	51·8	51·6	49·0	50·8
VII	A	2	13	3	50·3	48·4	52·7	50·6	54·2	48·6	47·9	50·0
	B	6	13	8	49·7	51·6	47·3	49·4	45·8	51·4	52·1	50·0

An inspection of Table X shows how extremely closely, both in progress through the standards and in their educational attainments within those standards, the boys in Class A and those in Class B approach each other. In progress marks they would be found to be almost identical; and in their marks for the various subjects in which they were examined there is little to choose between them. The following table shows this clearly :—

TABLE XI, showing average marks per boy throughout the school, corrected for inequalities due to variations in the comparative difficulty of the tests.

Class	Reading.	Spelling.	Arithmetic	Drawing.	English Composition.	Manual Training.	Mental Arithmetic
A	50·00	49·57	51·28	51·45	50·56	50·38	50·06
B	50·02	50·24	48·05	49·15	49·54	49·72	49·65
Percentage of B's Marks on A's	100·0	101·3	93·6	95·5	97·9	98·6	99·1

We are, perhaps, entitled to say that the boys in Class B are a little less proficient than the boys in Class A. In Spelling, they are better; in Mental Arithmetic, they are nearly as good; in Reading, they are quite as good. In Written Arithmetic, they are definitely lower; for in every standard but one (see Table X) the B boys are inferior in Arithmetic; and they are inferior in Drawing and Manual Work, but only very slightly so. The marks for Drawing in this school include, even in Standards II and III, those given for geometrical work with "rulers." This condition favours "intelligence" rather than mechanical executancy.

In the case of this school, the upshot of the investigation tends thus: Except in Arithmetic, no clear and regular difference of any magnitude can be found between the progress and scholastic attainments of the boys of Class A and those of Class B.

VI.—Summarized Conclusions.

I will endeavour to draw what Americans call a conservative conclusion. In the first school, where a big difference in the social class of the children who attended it was at once apparent, there was a serious difference in the progress and educational proficiencies within their standards of Class A and Class B, except in Drawing and Manual Work. In the second school dealt with, where the children were divisible into three social classes, those of Class A were older for their standards and less proficient than those of Class B, whilst those belonging to Class C were hopelessly behind. In the last school in which the investigation was made, it was difficult to divide the children into social classes, and there is no outstanding difference in their progress and attainments. A practical teacher would probably be convinced by a glance at the comparative ages of Classes A and B within each standard (see Table IX). I do not say he ought to be so easily convinced; but it is a rough practical test which is of much convenience for rapid use. Teachers will remember that all rules as to age and promotion tend to equalize the apparent progress of Classes A and B. And at the time of this investigation, four or five years ago, the teacher's aim was to bring the least proficient in his class up to a sort of level or "pass" standard rather than develop his more proficient pupils. That is not so much the case now as it was then, and doubtless there is much to be said for and against it. The point of relevance lies just here. The school rules and the teacher's efforts tended to obliterate the apparent differences between the Classes A and B, and possibly did so to some extent. That they did not succeed is evident from these results.

There is no very satisfactory evidence from this research as to the relative parts played by natural capacity and home environment in the production of the difference found between the higher and lower social classes. Both factors doubtless operate. The fact that one outstanding difference is in Arithmetic seems to indicate that a difference in natural capacity is a very large factor, for children do not usually get much help at home, either directly or indirectly, in this subject.

I need, perhaps, to say, to prevent misunderstanding, that in every subject and every standard some B boys are better than some A boys, though rarely as good as the best A boys. These conclusions as to the relative proficiency of the pupils in Class A and Class B are conclusions on the whole, that is, are drawn from the average results.

VII.—Pedagogical Inferences.

Do the foregoing conclusions enable to draw any useful inferences bearing on school organization?

There are many schools in which, like School "E.N.," the children attending are fairly homogeneous in class, and no very urgent need calls for reform in classification; though even in such schools as these there are some children who are mentally very proficient, and would benefit by a more advanced curriculum than that which is suitable to the great majority of those attending the school. Some of these children are removed at the age of eleven years and enabled, by means of scholarships, to continue their education in secondary schools. There is also a process now coming into operation by which children who are not suitable for secondary education, and yet are suitable for a heavier curriculum than that of the purely elementary school, may find a more fitting educational *milieu* in an intermediate, higher grade, or central school. All this is to the good; but it touches only the upper fringe of the problem of educational organization, just as the school for the mentally defective touches only the lower fringe. It does not help us in differentiating the curricula of the ordinary schools from one another. But need we do this at all? Is there any educational justification for it? Is it not right that every child shall have an equal chance educationally? Why then condemn some to an inferior curriculum?

I suppose every educational psychologist would not only admit, but assert, that the best curriculum for every child is that under which he makes most headway; that which, while giving him a certain educational community with other children, will cultivate his proficiencies. In this way he *really* gets an "equal chance."

Is this being done with the pupil of the lower social classes of elementary school children? His proficiences are manual and mechanically constructive. He is not more proficient absolutely even in these directions than the higher classes of elementary school children; but he is so relatively; his proficiency lies in these rather than in other mental aptitudes.

If these contentions be admitted, it would seem that we are committed to a differentiation of curricula between various types of schools such as practical administrators would hardly care to face, which is, indeed, a work for the future. But can nothing be done now? I think it can. For if the social classes attending the schools are different in different neighbourhoods, and if mental proficiency differs on the whole from one social class to another, it would be right educationally to adapt the curricula to the varying proficiences and deficiences of the children in different social classes. In the case of those schools attended by the children of two or more social classes some elimination of the smaller section or sections would be necessary. These are rough and ready practical distinctions, and not finely adjusted methods of procedure. The schools are roughly classified by the social classes they serve. Their situation roughly defines them. If we take care, as we assuredly must, that no stupid child of the more prosperous classes labours ineffectively at a curriculum too heavy and advanced for him, and no clever child of the poorer classes stays in a school whose curriculum is too easy for him, we can accept the present location or "neighbourhoods" of the schools as a basis of differentiation.

Classification based on such conditions is not ideal. The ideal would imply more than one psychological examination of every child in every school, and an endeavour to adjust his school career accordingly. Such an ideal is too far from actuality to be seriously considered by educational authorities just now. But the method I have suggested is justified by facts, is in accordance with the ideals of educational psychology, and is immediately practical with but slight disturbance of existing arrangements.

THE PSYCHOLOGICAL BASES OF SCHOOL GEOGRAPHY.

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I.—Direction and Orientation—*contd.*

The Problem stated.

It is well known that young children by the time they enter school make use of quite a large number of spacial terms denoting position—inside, outside, this side, behind, in front, down there, top, bottom—as well as others involving the notion of measurement, for example, size—big, little, tall. Such terms are used with great facility for practical purposes, no matter how vague their meaning content may be.* This is not surprising seeing that a spacial element is connected from the outset by way of extension and local sign, with sensations of sight and touch. Perceptional notions of spacial relations are, in fact, readily acquired. In marked contrast are the difficulties met with when we think of spacial relations as such. Compare, for example, the trouble children and even well-educated adults have in dealing with geographical direction and orientation.† It is important, then, to know what these difficulties are, how they arise, and how far they can be overcome or postponed.

Résumé and Results of previous contribution.

An attempt has been made‡ to show the way in which the terms "right" and "in front" gradually develop meaning, passing from vague extension by way of increasing analysis and synthesis to definite localization. Thus a boy of seven or eight years of age has little difficulty in thinking of half a room as being to his right if he stands in the middle of it, but he is not certain whether *all* the right-hand wall is to the right of him, while if the analysis is continued and he is asked to say whether an object in the right half of the room is to his right, he is in difficulties. A rough indication of the advance made by a child of eleven or twelve years of age in his connotation of the terms "right" and "in front" was afforded by the results of the investigation outlined on pp. 47-48. The results showed, moreover, that children exhibit an increasing tendency to limit the denotation of the terms "right," "left," "behind," "in front," and to think of space as divided into four quadrants with indefinitely-marked boundaries. At the same time along with the notion of extension there develops the notion of a definite direction. "In front" no longer means the space enclosed by an angle of 180°, nor even by an angle of 90°, but a direction, a straight line. Indeed, the same term now bears all three meanings with the result that an element of uncertainty arises in the use of the term.

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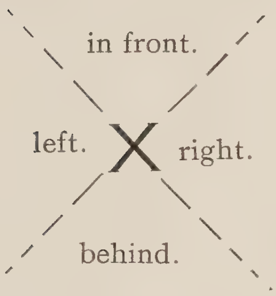
* cf., Mitchell—*Structure and Growth of the Mind*; also, *Study of Mathematical Education*, Branford, p. 2.

† cf., *The Teaching of Geography*, Geikie, p. 60, and the article on the *Teaching of Geography*, Sarah Young in *Studies in Education*, Earl Barnes, II, p. 373.

‡ *v.* March No. of this Journal.



The meaning given by the children to the term "north" was also investigated. There is, of course, a difference in this case and in the preceding ones. Definite attempts had been made at some time or other to teach the children the *points* of the compass. This is a procedure common to most schools, and finds a place very early in the school career of the children. The methods adopted vary very considerably. Here it is by means of lines drawn on the floor of the school, there by means of the mariner's compass; much more rarely the children make systematic observation of the position of the sun in the sky. Sometimes the teacher is satisfied with vaguer notions—"north is over there," "the sun rises in the east and sets in the west." In spite, however, of teaching influences, a study of the results points to much the same course of development in the minds of the children as that found in the case of the less technical terms, "right" and "in front."* This is noteworthy, as one of the primary schools has a local reputation for outdoor observational work, and one of the secondary schools is well known for its practical geography.

It is important to note that very few of the children examined seem to think of direction in the abstract. By far the greater number of those who thought of north as direction regarded it as along a line on the floor or along a strip the width of one's body. Out of a total of 1807, 29 thought of it as a direction at the level of the eye, and 8 boys, 14 years of age or more, as the direction of an imaginary vertical plane running from the observer.

Geographical Orientation.

It is commonly assumed that simple orientation on a map, the top of which is north, presents little difficulty to children. An investigation carried out in two of the primary schools confirmed the truth of this.

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* *v.* curves, p. 51a.

Each child was given a hectographed map of England and Wales and required to write down the position of three towns with reference to Sheffield. But ability of this sort does not necessarily imply any real power of dealing with geographical orientation. Question 2[*] was framed with a view to investigating this point. Two objects, B and C, in a line due east and west, B being east of C, were placed in front but to the right of the observer facing south, and the children were required to write down the position of B with reference to C. The answers were dealt with in the manner already described under Question 1[†]. The following is a summary of the results:—

A. Correct (includes a).
a. Correct, but say *due* E.
B. Unattempted, or meaningless answers.
C. Incorrect: East, West (or N. S.) inverted.
D. The direction of B and of C from A given.
E. Orientation determined by a *fixed* N.S.E.W. *cross.*
Ee. Do., do., implied.
Ee′ Do., do., explicitly stated. (E = Ee + Ee′)

General Summary.

		Average Age of Pupils.	Total % correct (A).	% due E. (a.)
Secondary School	I	13·3	37·7	7·7
,, ,,	II	13·4	59·5	18·3
,, ,,	III	13·3	57·3	14·6
,, ,,	IV[‡]	15·1	82·9	17·7
Primary School	V	10·3	54·5	2·7
,, ,,	VI	10·9	69·0	7·0
,, ,,	VII[§]	11·2 (11·1)	43·8 (52·6)	·4 (·7)

Percentage Summary according to ages (all schools combined).

Age	(8)	9	10	11	12	13	14	15	(16)
A.	(50·0)	50·0	51·0	56·4	54·7	57·2	59·5	65·0	(69·0)
a.	(1·0)	0·6	1·7	2·3	6·8	11·2	18·0	18·4	(26·2)
B.	(36·9)	26·1	22·1	19·7	14·7	8·6	5·5	5·0	(0)
C.	(3·2)	3·4	4·8	6·0	6·2	6·0	6·5	7·0	(9·5)
D.	(0)	1·1	2·6	3·2	4·4	9·7	9·0	7·6	(11·9)
E.	(4·3)	15·9	17·1	15·1	16·8	16·0	18·5	12·1	(9·5)
Ee	(4·3)	15·9	13·0	11·0	9·7	11·2	13·0	11·5	(9·5)
Ee′	(0)	0	4·1	4·1	7·1	4·8	5·5	0·6	(0)

Ages 8 and 16 are bracketed as the results are obtained from a smaller number of papers, and consequeutly are not so reliable as the others.

A study of these results shows that the secondary school pupils have not made much advance on the pupils from primary schools in power to deal with this simple problem of geographical orientation, though the average age of the former is from two to three years in advance of the latter. This is seen still more clearly on plotting the total correct answers for each age. Hence in spite of differences in

[*] *v.* p. 49.

[†] *v.* p. 50.

[‡] Not a complete School.

[§] In this school the papers from a class of 53 boys seemed doubtful. The numbers in brackets include these.

teaching, power to deal effectively with geographical orientation is a thing of slow growth. Schools I and VI, that give somewhat exceptional results, have already been referred to as devoting special attention to practical work. The poor results from School I are due to an unusual proportion of blank papers returned, as well as to an excessive number of results in B and D.

Attention is called to the increased discrimination with age in the use of the terms "east" and "due east." This affords indirect confirmation of the view put forward in dealing with "right," "north" and "in front," of the way in which such terms develop meaning. The number of results in C is also noteworthy. The tendency of children to interchange east and west is repeatedly met with, and in some children it has become a habit. There is no doubt that in some cases east and west have come to be interchanged as a result of careless memorizing, arising out of the fact that we normally repeat the terms in the order N.S.E.W., and the tendency to think and write E.W. rather than W.E. is very strong. Clear evidence of this was found in a number of the diagrams that were given in answering Qs. 1 and 2. In other cases confusion results from having learnt some such statement as "east is right and west is left," or vice versa. Some children, again, when orienting objects picture themselves as always facing north (or south), and they are not careful to analyse each new situation.

The bad effects of teaching the *points* of the compass by lines drawn on the schoolroom floor is seen in the high percentage of results in E. Theans wers grouped here fall into two subdivisions. Ee′ consists of those who regard the line E.W. in the diagram as the Equator, and the whole cross as a skeleton plan of the earth. Some, indeed, seem to think of the lines as being centrally fixed in space, and of everything as oriented from the point of intersection. Few of these children have any notion of direction apart from the lines: they look upon them, in fact, as the *four points of the compass*. The children who fall into group Ee have ideas that are not very dissimilar from the preceding ones. Thus, B is S. of C "because it is nearer the south line," or "because it is more southerly than C." Again it is S.E. "because it is nearer S. and E. than C," or it is S.W. of C presumably because it falls on the S.W. line. Similarly B is said to be N.E. of C, or N. of C. It cannot be that bad drawing is the cause of these answers, for the majority have reproduced the diagram on their papers, and in no instance was it inaccurately drawn. Furthermore, the results in D cannot be accounted for by assuming that the children understood the question to mean that B and C were both to be oriented from A, because not only does the number of such answers increase with age but a minority of the older boys try to solve the problem mathematically. Some of them, indeed, say that a solution is impossible for want of sufficient data. Not more than a dozen children add a note to the effect that A has nothing whatever to do with the position of B and C.

It seems clear that misconceptions of the kind indicated in these answers could not exist if children were accustomed to think of N.S.E.W. with reference to a sphere. By handling globes and seeing the necessity for some convention in order to indicate location, children would come to think of an infinite number of directions, all due east or due north. It is only then that the points of a compass can be given a true meaning.

The following is a list of typical answers for comparison :—

1. C lies east or on the right-hand side of B. (S.S. 15.)[*]
2. B is more north than C and is nearer to A. B is east of C and nearer south than north. (S.S. 14.)
3. Facing B and C the east would appear to be west, and vice versa, ∴ B would be N. of C. (S.S. 15.)
4. Standing at A and looking towards C one would say B was N.E. from C. (S.S. 14.) (Gives diagram.)
5. Position of B is (from A) to the west of C, but in ordinary circumstances would be east of C. (S.S. 15.)
6. B is so much N.W. from A. (P.S. 13.)
7. 2,070 miles apart. (P.S. 13.)
8. B in reference to C would be S.W. (S.S. 12.) (Gives diagram.)
9. B would be practically as near the south as C will be near the west. ∴ S.W. (P.S. 12.)
10. B is at an angle of 30°, but C is at an angle of 45°. (P.S. 11.)
11. C is $\frac{1}{3}$ of the way from the west to the centre or equator. (P.S. 12.)
12. B is $\frac{1}{3}$ west and C is $\frac{2}{3}$ west. (S.S. 14, also P.S.)
13. B is horizontal with C. (S.S. 11.) (Gives diagram.)
14. C would be S.W. and B, S.S.W., because at whatever point A was, the cardinal points would be always the same. (S.S. 14.) (Gives diagram.)
15. B is left of you and C is right of you. (P.S. 9.)
16. B would be S.E. of C. (P.S. 11.) (Gives diagram.)

Mention has already been made of the ease with which children orient positions on a map, the top of which is north. Question III was set in order to see what influence an alteration in the usual position of north made. Each child was presented with a copy of the map[†] which represented a neighbourhood equally unfamiliar to all. Four objects required to be oriented. The following is a summary of the results :—

A.—All four positions correct.

B_1, B_2, B_3, B_4.—Positions of river, church, prison, fort, respectively correct.

C_1, C_2, C_3.—Do., do., incorrect, through taking top of map as north.

C_4.—Fort described as south.

D_1, D_2, D_3.—Position of river, church and prison respectively incorrect, through interchanging E. and W.

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[*] SS.15 = Secondary School pupil. P.S. = Primary School pupil.

[†] *v.* p. 49.

Percentage Summary in ages (all schools combined*).

Age	(8)	9	10	11	12	13	14	(15)
A.	(8·7)	21·3	25·8	29·7	45·6	57·3	54·8	(66·3)
B_1.	(38·0)	46·6	50·2	48·1	66·1	79·0	77·3	(83·1)
B_2.	(46·7)	59·8	63·9	58·5	76·6	85·5	86·9	(91·9)
B_3.	(35·8)	47·1	53·2	50·0	69·6	81·0	75·6	(87·6)
B_4.	(14·1)	39·7	45·4	42·0	61·7	72·6	76·2	(85·4)
C_1.	(29·3)	25·3	25·9	25·5	13·6	4·0	4·8	(2·2)
C_2.	(29·3)	25·9	23·9	25·0	12·3	5·2	3·0	(2·2)
C_3.	(31·5)	24·1	29·3	23·6	12·7	4·9	3·0	(2·2)
C_4.	(28·3)	12·1	8·7	13·2	6·0	4·0	1·2	(2·2)
D_1.	(7·6)	13·8	8·8	10·4	9·8	9·0	10·7	(4·5)
D_2.	(7·6)	9·2	3·9	8·5	7·0	7·3	5·4	(3·2)
D_3.	(4·3)	7·5	5·9	5·7	3·5	2·0	2·4	(1·1)

(Unattempted or meaningless answers are not tabulated. They can be arrived at by inspection of the above.)

As will be seen, the curves resulting by plotting A—B_4 are all of the same shape. This is also true of curves C_1—C_3 and of D_1—D_3. That the results in A are not higher is due often enough to children having in one of the positions interchanged E. and W., or thought of the top of the map as north. Though, generally speaking, the latter tendency shows a diminution with age, the results in D_1 and D_2 again point to the habit some children have of interchanging E. and W. The answers indicating the position of the fort were not always easy to deal with. Such varying directions as S., S.W., W., E., N., N.W., being given. Children who described the direction of the church as S.S.W., and of the prison (inaccurately) as N.N.W., were nevertheless content to say that the fort was south. A number of these seem to have oriented the object from the arrow instead of from the city cross. This is certainly the case with those who describe the four directions as W., S.W., W., S., respectively. A few children make use of one or more of the terms, "right," "left," "behind," "in front," to help out the more strictly geographical nomenclature.

To sum up, the results seem to show that children's power to orient even the simplest positions on a map is very uncertain. Their notions of direction are too stereotyped to meet unusual conditions. This is probably the result of the early methods of teaching already referred to. It is only gradually, and with considerable difficulty, that children can free themselves from the artificial, not to say erroneous, notions then acquired. Moreover, they are seldom given practice in describing with the position of objects except as they occur on a map.

The influence of early teaching is further emphasized by the results of Question 4. This question was set to determine what such a general statement as "the sun rises in the east and sets in the west" stands for in children's minds, and what changes in meaning it undergoes with age and increased experience. All answers that in any way implied that the position of the sun at sunrise constantly altered, that, in fact, east means due east on only certain occasions (two) in the year were credited as correct. The following is a summary of results:—

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* This Question was not set in School IV.

A.—Correct (and apparently correct).

B.—E. W. mean the points of the compass, or the extremes of the Equator.

b.—E. W. mean the points of the compass.

C.—East means a particular part of the earth.

c.—East has a fixed location, e.g., the Eastern Hemisphere, the east of England.

c'.—East and west (or right and left) of Greenwich, or east of the earth.

D.—No answer—East means right or left, the direction of sunrise; or the statement "the sun does not rise, it is the earth that moves."

E.—Not attempted, or meaningless.

Percentage Summary in ages (all schools combined[*]).

Age	(8)	9	10	11	12	13	14	15	(16)
A.	(0)	0	0·6	0·6	1·9	4·9	5·7	9·6	(14·3)
B.	(1·1)	0	4·4	7·1	6·4	7·4	10·3	10·9	(9·5)
b.	(1·1)	0	2·2	2·4	4·9	6·9	8·7	9·6	(7·1)
C.	(2·2)	2·6	6·2	8·3	9·4	13·9	10·3	10·3	(4·7)
c.	(2·2)	2·0	5·6	3·0	2·3	2·5	3·1	1·3	(0)
c'.	(0)	0·6	0·6	5·3	7·1	11·4	7·2	9·0	(4·7)
D.	(71·1)	75·2	69·0	66·6	65·4	56·5	55·7	54·5	(52·4)
E.	(25·5)	22·3	19·6	17·3	16·9	17·2	18·0	14·7	(19·0)

Of 1,526 answers, only 53 fall in A; of these, 26 are more or less doubtful. The curve shows a steady rise with age, the sharp rise at 13 being due to the fact that correct answers begin to be given at this point, supplementing the doubtfully-correct answers which begin earlier. The results in D and E show that to young children such a statement as the one under investigation means nothing. Practically all under 10 years of age fall into one or other of these two groups. Though curve D falls steadily with age, more than 50% of 16-year-old pupils fall into this group. The fact that curve E runs practically level from 11 years of age is significant.

In studying the attempts children make to understand the statement, the steadily-rising curve *b* is noteworthy. It shows that a small but increasing proportion of children decide that "east and west" are E. and W. points of the compass. Curve c' sets out the effect that hearing of the meridian of Greenwich has on children's interpretation of the statement. The practically level curve *c* is evidence of the tenacity with which children hold to the notion of a definite east and west hemisphere, or a definite locality being universally east, once such ideas have gained a foothold in their minds.

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[*] The question was not set in Primary School VII.

Secondary School I has already been specially mentioned. In this school 21·1% of the boys fall into Group A. Neither of the Primary Schools, however, record a single result in this class.

In view of the fact that the children in these two Primary Schools seemed to have very indefinite notions of the meaning of east, the following questions were set orally in another Primary School to children of Standards III—V:—

"A man starts to walk due north from Sheffield. Another man starts from Liverpool at the same time and walks due north. Supposing they could go on walking at the same rate as long as they like, would they ever meet? If so, where?"

A similar question was set, assuming the men to be travelling due west, from Sheffield and Southampton.

(In cases of doubt the relative position of the starting points was shown diagrammatically.)

A number of the older children answered the first question correctly, but none could answer the second. All were agreed that the men would meet somewhere, at the outside in America, if not long before. These results, in conjunction with those of Q. 4, point to the fact that unless special care is taken, E. and W. are regarded as "poles" in the same way as N. and S. This would be impossible if globes were used in the early stages of geography teaching instead of so much reliance being placed on maps.

A few typical answers are appended:—

1. East and west are two imaginary places.
2. East is where the Equator meets the circumference (or horizon).
3. The area of the land on the right hand side of the line of longitude running through Greenwich.
4. The east side of the heavens.
5. The left-hand side as we face the Equator.
6. East and west of the position of greatest height.
7. The sun appears to travel from east to west, but it is the earth that moves.
8. The point on the horizon where the sun appears.
9. East and west of the centre of the earth.
10. It means the positions are opposite each other.

General Summary and Conclusions.

1. The ordinary spacial terms, right, left, in front, show a gradual enrichment of meaning. The order is from vague extension, through increasing analysis and synthesis, to definite direction and extension.
2. In spite of the variety in current methods of teaching, the terms north, south, east, west, show a similar order of development.
3. Accurate notions of east and west are commonly acquired somewhat later than those of north and south owing to the fact that there is no one point on the earth which is universally due E.
4. In the early teaching of direction the expression, "the four cardinal points," is misleading and should not be used.

5. Few children under 16 years of age seem able to think of direction apart from some conventional representation of it.
6. It is the more important since some convention seems to be necessary that the early teaching of direction should not lay the foundation of wrong ideas. Instead of teaching the points of the compass, it is advisable to rely *(a)* on continued outdoor observation and record of the position of the sun and then of the north star; *(b)* on a study of ways of indicating direction on a globe.
7. The difficulties of orientation are primarily due to imperfect notions of direction, and secondarily to want of familiarity with actual problems involving it.
8. The globe is essential in gaining clear ideas of direction, and each child ought to have one at his disposal.
9. The compass should be introduced last of all, for two reasons:—
    (a) It emphasizes unduly four fixed points or directions.
    (b) It tends to confusion when compass direction is seen not to agree with direction as determined by the sun.
10. The attempt to teach direction by four lines drawn on the floor should be abandoned.

Some further light on the general question of spacial ideas might come from a study of the vocabularies of paimitive people.

It would be unfitting to conclude this section of the investigation without acknowledging my indebtedness to Professor Green, not only for his kindness in undertaking the tedious task of marking and entering up the results of Q. 4, but much more for his constant encouragement, his stimulating criticism, and ever-ready help.

Postscript.

Since writing the above I have looked up Herbert Spencer's Chapter on *Spacial Perception*, which closes as follows:—

> "There is good reason to think, therefore, that the consciousness of space is reached through a process of evolution, which begins with it in so rudimentary a state that it cannot properly be called a consciousness of space, in the sense we ordinarily give to the word; and that in the course of the evolution new elements are added, combinations between them and the primitive elements are formed, and the consciousness becomes more complex at the same that it integrates and widens."

THE EVIDENCE OF MENTAL FATIGUE DURING SCHOOL HOURS.

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(Continued.)

Changes in Sensitivity of the Skin during the School Day.

These observations were divided into three series. The First Series (Part A) includes all records taken at 10 a.m. and at 12. Part B, all records taken at 12 and 4 p.m. In both cases the records that are compared are taken on the same day. Series II contains records taken at 10 a.m., 12, and 4 p.m., that is to say, when the three readings were taken on the same day. And Series III, which also includes records at 10 a.m., 12 and 4 p.m., but the method by which the sensitivity was estimated differed from Series II.

Series I. Part A and B.

The number of records in this series amounted to 107, Part A, and 100, Part B.

On the whole there appears an increase in sensitivity at 12 as compared with 10 a.m., and at 4 p.m. as compared with 12.

A further explanation of the method and use of the æsthesiometer can be obtained in the Report of the International Hygienic Conference, 1904.

The gain in each case is very slight, almost too small for practical purposes, and a great number of cases would be necessary before the effect of chance would be eliminated. See Table XI, A and B.

In an analysis of the number of times that this improvement took place, it is seen that there were 63 readings out of 107, where improvement or equality in the records was observed at 12 as compared with the records at 10 a.m. This proportion is equivalent to 58%.

Also out of 100 records at 12 and at 4 p.m., improvement or equality at 4 p.m. occurred 61 times, e.g., 61%.

In each case there is, therefore, a slight tendency for the sensitivity to increase at 12 and at 4 p.m.

Average Individual Results of the Changes in Sensitivity.

TABLE XI. A AND B.

A.

Subject.	No. of Exper.	Sensitivity according to changes in threshold.	
		10 a.m.	12
F.B.	17	1·42 cms.	1·41 cms.
M.H.	14	1·02 ,,	1·00 ,,
B.B.	16	·64 ,,	·63 ,,
B.T.	15	·63 ,,	·63 ,,
G.L.	17	·92 ,,	·86 ,,
M.S.	12	·88 ,,	·84 ,,
G.B.	16	·91 ,,	·89 ,,
Total No.	107		

B.

Subject.	No. of Exper.	Sensitivity according to change in threshold.	
		12	4 p.m.
F.B.	17	1·55 cms.	1·44 cms.
M.H.	14	1·05 ,,	1·07 ,,
B.B.	15	·63 ,,	·56 ,,
B.T.	15	·69 ,,	·65 ,,
G.L.	14	·85 ,,	·86 ,,
M.S.	11	·89 ,,	·83 ,,
G.B.	14	·94 ,,	·90 ,,
Total No.	100		

The number of times that equality or improvement was observed at 12 and at 4 p.m., as compared with 10 and 12 respectively.

Subject.	No. of Exper.	Equality or Improvement at 12.	No. of Exper.	Equality or Improvement at 4 p.m.
F.B.	17	9 times	17	11 times
M.H.	14	6 ,,	14	7 ,,
B.B.	16	10 ,,	15	12 ,,
B.T.	15	10 ,,	15	9 ,,
G.L.	17	12 ,,	14	8 ,,
M.S.	12	7 ,,	11	7 ,,
G.B.	16	9 ,,	14	7 ,,
			Total No. 100	

Series II,

In which three readings were taken on the same day, included 78 experiments. In Table XII the average individual results are given.

TABLE XII.

Average Individual Results at 10 a.m., 12 and 4 p.m.

Subject.	No. of Exper.	Variations in Sensitivity as given by the threshold.		
		10 a.m.	12	4 p.m.
F.B.	13	1·51 cms.	1·53 cms.	1·41 cms.
M.H.	10	1·03 ,,	1·02 ,,	1·07 ,,
B.B.	12	·54 ,,	·56 ,,	·51 ,,
B.T.	11	·60 ,,	·61 ,,	·56 ,,
G.L.	12	·89 ,,	·86 ,,	·83 ,,
M.S.	8	·58 ,,	·60 ,,	·55 ,,
G.B.	12	·79 ,,	·79 ,,	·77 ,,
Total number of Exper.	78	Av. = ·93 cms.	·94 cms.	·91 cms.

The improvement at 12 is not so constant a feature as in Series I. Four subjects show a slight deterioration. The improvement at 4 p.m. is still apparent.

If closer analysis is made into the number of times that this improvement took place, it is seen to occur 45 times at 12 and 48 times at 4 p.m., a proportion of 67 and 61% respectively.

TABLE XIII.

Analysis of the number of times that Equality or Improvement was observed at 12 and at 4 p.m. as compared with 10 a.m.

Subject.	No. of Exper.	Equality or Improvement at 12.	Equality or Improvement at 4 p.m.
F.B.	13	8 times	8 times
M.H.	10	5 ,,	5 ,,
B.B.	12	7 ,,	10 ,,
B.T.	11	7 ,,	7 ,,
G.L.	12	7 ,,	7 ,,
M.S.	8	4 ,,	6 ,,
G.B.	12	7 ,,	5 ,,

Without further proof such a slight tendency is not sufficient basis for any conclusion. Accordingly the difference between the two means in each case at 10 and 12, and at 10 and 4 p.m., was compared with the probable error.

The difference between the means at 10 a.m. and at 12 was equal to ·01 mm.

The probable error of the readings at 10 = ·0205.

The probable error of the readings at 12 = ·0109.

$$\sqrt{\cdot 0205^2 \pm \cdot 0109^2} = \sqrt{\cdot 00049698} = \cdot 022$$

∴ The difference between the two means is less than three times the probable error.

Also:—

The difference between the mean at 10 and at 4 p.m. was equal to ·02 mm.

The probable error of the readings at 10 a.m. = ·0205.

The probable error of the readings at 4 p.m. = ·00876.

$$\sqrt{\cdot 0205^2 \pm \cdot 00876^2} = \sqrt{\cdot 00049698} = \cdot 0222.$$

∴ The difference between the mean at 10 and at 4 p.m. is less than three times the probable error.

The conclusion was drawn that the tendency for the sensitivity to decrease at 12 and to increase at 4 p.m. was neither consistent nor large enough to eliminate the possibilities of chance.

The negative conclusion of Series I may be due to error involved in the method employed. It was therefore decided to estimate the threshold by the "Contrast Method" during the Winter Term.

Certain investigators, among others Dr. Vannod, have objected to the maximum and minimum method hitherto used, since it is open to the objection that suggestion must play an important part in the judgment.

The subject knows that the first contact is two, and that it is followed by a certain number of contacts, all of which are getting less.

In this Series the points were just applied at a distance above the threshold, then approximately near to the threshold, then one point only was given. Suggestion could play no part, as the subjects were not aware of any order in the manner of application.

The contacts were repeated, the actual order had to vary with the individual, as carelessness in answering "two" when only one point was applied led to more readings being necessary before the threshold when the subject first appreciated two could be estimated with any certainty.

The actual threshold is touched more than once in this method, and it was observed that the subjects very seldom altered their judgment of this distance, thus proving that the children were consistent and reliable subjects and that their judgments were, as far as possible, satisfactory.

Five of the subjects were the same as those who had joined in the Summer experiments.

This Series lasted for 54 days. On each day the records were taken at the usual times—9.45 a.m., 11.45 a.m., and 3.45 p.m.

Special precaution was taken that the children were not hurried; if doubtful of an answer the distance was given again.

It should be mentioned that in this Series Griesbach's Æsthesiometer was used. This instrument avoids any error that may be due to difference in pressure.

The points are blunt, and by means of a small spring the pressure can be estimated and kept constant throughout a series. The distance can be accurately read by a millimetre scale and vernier.

The average threshold shows that the variation is a very slight one, there being a decrease of ·15 mm. at 12 and ·3 at 4 p.m.

TABLE XIV.

Average Threshold at 10 a.m., 12 and 4 p.m.

No. of Subj.	No. of Exper.	Average Threshold at		
		10 a.m.	12	4 p.m.
6	54	8·5 mms.	8·35 mms.	8·30 mms.

TABLE XV.

Average Threshold of each Individual.

Subject.	Average Threshold at:		
	10	12	4 p.m.
M.M.	9·3 mms.	8·7 mms.	9·08 mms.
B.B.	10·07 "	9·5 "	9·07 "
M.H.	10·1 "	10·2 "	10·6 "
B.T.	7·1 "	7·4 "	6·8 "
M.S.	8·6 "	6·8 "	7·05 "
G.B.	5·4 "	5·85 "	6 "

Individual averages likewise show improvement in all but two subjects. Depreciation in sensitivity was observed at 12, only twelve times out of the 54 experiments, a number equivalent to 22%

Depreciation in sensitivity occurred 15 times at 4 p.m., a proportion of 27%

It will be noticed that two subjects, M.H. and G.B., showed a decrease after morning and again after afternoon school. If the results of these subjects are taken together, the mean at 10, 12, and 4 p.m. is found to be:—

8·1 mms. 8·4 mms. 8·7 mms.

The standard deviation of these three series are respectively:—

2·6 2·5 2·8

The probable error is calculated as:—

·384 ·371 and ·418

The difference between the mean at 10 and at 12 = ·3.

The probable error of these two Series = ·53.

The difference between the mean at 12 and at 4 p.m. = ·6.

The probable error of these two Series = ·58.

In neither case is the difference between the means sufficient to eliminate the possibility of the variation being due to chance.

The conclusion drawn from this Series agrees with that found in the preceding,—that the fatigue of the school day did not cause any consistent variation in the sensitivity of the children. The only tendency that was observed was a slight increase in the sensitivity after morning and afternoon school.

THE EVIDENCE OF MENTAL FATIGUE IN THE SPEED AND ACCURACY OF MENTAL WORK BEFORE AND AFTER THE SCHOOL DAY.

Six subjects took part in this series of experiments which took place during the Summer Term, on Tuesdays and Thursdays.

Both the number of sums and faults were calculated for each 5 minutes.

TABLE XVI.

The total number of sums worked every 15 minutes at 10 a.m., 12 and 4 p.m., and the work done in each five minute period.

Subj.	No. of Exp.	Work in each 5 minute period.											
		10 a.m.				12				4 p.m.			
		I.	II.	III.	Total	I.	II.	III.	Total	I.	II.	III.	Total
M.H.	35	614	634	684	1932	695	647	706	2048	587	684	596	1867
G.B.	39	638	631	607	1876	643	634	650	1927	477	619	552	1648
F.B.	39	1092	1086	1081	3259	1128	1117	1119	3364	1029	1101	1110	3240
B.T.	39	1325	1359	1391	4075	1397	1438	1429	4264	1320	1391	1433	4144
M.S.	30	504	518	505	1527	547	544	544	1633	510	510	536	1556
G.L.	36	960	967	1024	2951	1049	1027	1043	3119	935	975	993	2903
Percentage Relation to first 5 minutes.		100	101·2	103		106·3	105·3	106·9		94·6	102·8	101·7	
Percentage Relation of total sums of 15 mins.					100				104·5				90·8

An improvement in speed is apparent after the morning school. This is a constant feature in the average results, and actually occurred 48 times out of the 72 experimental days, a proportion equal to 66%

Analysis also shows that the decrease at 4 p.m took place 39 times, or 53%

In order to see how far this depreciation was a chance or significant variation, the difference between the mean result of the morning and afternoon reading was compared in the case of each subject with the probable error.

TABLE XVII.

A comparison of the difference in the mean at 10 and at 4 with the probable error.

Subject.	Mean of Result 10 a.m.	12	Difference in Mean.	Probable Error.
M.H.	175·6	169·7	− 5·9	15
G.B.	144	127	− 17	8·1
F.B.	250·7	259·2	− 1·5	—
B.T.	313·6	318·7	+ 5·1	
M.S.	152·7	155·6	+ 2·9	
G.L.	245·9	241·9	− 4	—

The probable error was not worked out when the difference in the means was extremely small.

In only one case, G.B., was the difference equal to twice the probable error, and it is believed that this difference is not large enough to estimate the possibility of chance.

It appears from the average of the total number of sums that the decrease was due to a diminution in the number accomplished in the first 5 minutes at 4 p.m.—Table I. To confirm this, the relation of the first 5 minute period to the two subsequent periods is examined at 10, 12, and 4 p.m. Taking the two last periods as equal to 100 the relation of the first will be seen in Table XVIII.

TABLE XVIII.

Percentage Relationship of the 2nd and 3rd 5 minute periods to the first period:—

Subj.	No. of sums in 2 final periods.	No. of sums in first period.	No. of sums in 2 final periods.	No. of sums in first period.	No. of sums in 2 final periods.	No. of sums in last period.
	10 a.m.	10 a.m.	12	12	4 p.m.	4 p.m.
G.L.	100	48	100	56	100	47
M.H.	100	46	100	51	100	45
G.B.	100	51	100	50	100	40
F.B.	100	50	100	54	100	46
B.T.	100	48	100	48	100	46
M.S.	100	49	100	50	100	48

It is apparent from the results shown in Table XLIV that the first 5 minute period is relatively lower at 4 p.m. than it is either at 12 or at 10 o'clock. This result is in harmony with a statement made by Dr. Rivers to the effect that the influence of *Anregung* appears to enter later in the final periods of metal work than in the beginning periods. From this the conclusion would appear that the capacity for *Anregung* decreased during the course of the Experimental Day; a deduction which agrees with the assumption of progressive fatigue. (" Fatigue and Recovery." Psych. Arbeiten. I.)

It is concluded that the evidence of fatigue is more apparent in the manner of working than in the actual decrease in speed.

With regard to the accuracy of the work. The number of faults have been calculated in the percentage of sums done.

TABLE XIX.

Number of faults in periods of 15 minutes work:—

Subject.	10 a.m.	12	4 p.m.
M.H.	23·2%	24 %	23·1%
G.B.	10·8%	10·5%	10·7%
F.B.	10·4%	10·8%	10·3%
B.T.	1·3%	·8%	·9%
G.L.	16·4%	16·9%	14·2%
M.S.	16·6%	17·0%	17·1%

It will be seen that the variation in accuracy is very slight before and after school. Five subjects actually show an improvement at 4 p.m., while with one the faults are a little increased.

It is concluded that there is no evidence of fatigue in the accuracy or speed of the mental work at 12 or at 4 p.m.

That the only variation that can be attributed to the effect of fatigue lay in the late appearance of the effect of *Anregung.*

Variations in Muscular Capacity during the School Day.

A preliminary Series was taken during March and April. This included 33 experimental day records being taken on 7 subjects before and after Morning School.

The variations were very small between the two readings. The average results show a tendency to increase rather than to diminish at the mid-day reading.

Only two subjects show a diminished record at 12, but this tendency was not confirmed in the Second Series.

The only conclusion that could be drawn from this preliminary Series was, that the fatigue of the Morning School did not exert any depreciating influence on the muscular grip of the right hand.

TABLE XX.

The Average Number of Kilograms recorded at 10 a.m. and at 12:—

Total No. of Exper.	Subject.	Kilograms.	
		10 a.m.	12.
33	M.H.	9·3	9·5
	F.B.	9·7	10·7
	B.B.	9·3	9·6
	B.T.	8·0	7·8
	G.L.	13·0	15·1
	M.S.	10·2	11·1
	G.B.	4·6	3·7

The Second Series consists of 75 days during the Summer Term and 39 days during the Winter, giving a total of 114 days.

The records were taken 3 times a day, before and after Morning School, and again at the close of the Afternoon School.

TABLE XXI.

Average Results of Individual Subjects at 10 a.m., 12 and 4 p.m.

Days.	No. of Exper.	Subject.	KILOGRAMS.		
			10 a.m.	12	4 p.m.
18	54	M.H.	11·3 kilos.	11·6 kilos.	12·1 kilos.
12	36	F.B.	9·8 „	9·8 „	10·2 „
16	54	B.B.	13·8 „	14·4 „	14·4 „
19	57	B.T.	15·5 „	15·9 „	16·0 „
12	36	G.L.	16·1 „	16·6 „	15·8 „
10	30	M.S.	15·1 „	14·0 „	14·9 „
19	57	G.B.	9·6 „	9·9 „	10·5 „
8	24	M.M.	11·8 „	11·5 „	11·6 „

At 12 o'clock a general improvement was noticed, a decrease only occurring 32 times out of the total 114 days.

At the end of the day the average results again show an improvement, a decrease only occurring 29 times.

To test the significance of the diminution in the case of the three subjects, G.L., M.S. and M.M., the mean of their morning and afternoon readings was compared with the probable error.

Let M_1 and M_2 = Mean of Morning and Afternoon Readings.

Then $M_1 - M_2 = 14{\cdot}6 - 14{\cdot}4 = {\cdot}2$

The Probable Error was found: 1 = ·47

The difference between the two means is not large enough to justify the conclusion that the variation has any significance.

If, therefore, there is no significance in this diminution, and the other subjects exhibit a tendency to improve, the only general conclusion to be drawn is, that the School Day does not have a depreciating influence on the Muscular Capacity.

The conclusion that is deduced from this Series is that the Mental Fatigue of the School Day does not cause any consistent depreciation in the sensitivity of the child, in the Muscular Capacity, or in the speed and quality of 15 minutes mental work.

Variations in the Muscular Capacity as tested by the Ergograph.

The ergograph was kindly lent by Dr. Waller from the University Laboratory, and permission was obtained to set it up in the school. In this instrument the weight is attached to a wire which passes over a pulley and is fastened to a cylinder. Each time the subject flexes the finger she revolves the cylinder and winds the wire round it. Between each flexion the weight is held, accordingly the muscular capacity can be fairly accurately estimated in kilogram-metres. A writing point attached to the cylinder enables a record to be obtained.

Two series of experiments were made. In the first series there were seven subjects whose average age was 11 years. Each experiment consisted of one record: those taken at 9.30 were compared with those taken at 4 o'clock in the afternoon. In this series it was not possible to take both records on the same day, but in the average results only consecutive records have been compared together. The weight used was one and a half kilograms, the rhythm 60 per minute. In the second series there were five children whose average age was 12 years. The weight used was two kilograms, rhythm as before. Three records were taken in every experiment, a pause of 30 seconds being allowed between each. The experiments were made at 9 a.m. and at 1 p.m. on the same day.

Series I.

This series consisted of 156 records, the average of which is given in Table XXV:—

Average of 78 records at 9.30 a.m. and 78 records at 4 p.m.

	9.30 a.m.			4 p.m.		
Subject.	Total Muscular Perf.	Number.	Average Height.	Total Muscular Perf.	Number.	Average Height.
	Kgm.		Cms.	Kgm.		Cms.
T.	1·3	98	1·7	1·5	104	1·8
S.	1·3	87	1·9	1·4	90	2·0
R.	2·2	110	1·78	3·2	173	1·73
C.	2·4	120	1·6	2·8	170	1·3
P.	1·5	99	1·2	1·7	105	1·4
W.	1·5	82	1·64	1·6	89	1·66
M.	1·6	92	1·2	1·5	93	1·0

It will be noticed that there is an improvement at 4.30 p.m. in the total muscular performance in all but one case. This increase was principally due to the number of flexions, very little difference being noticed in the height. In three cases the height was actually less. With the subject E the variation was too small to be significant, but with C and M the difference between the two means was in each case more than three times the probable error, the difference being ·3 and ·9 respectively, while the probable error was calculated as ·09 in the case of C and ·07 in the case of M.

How far this is due to mental fatigue needs confirmation by more definite mental work. The fact that it occurred only with two children is a point against this possibility; there was no reason for believing that these children were more fatigued than the others.

Series II.

This series was taken with children belonging to a Secondary School. It consisted of 50 experiments, exclusive of preliminary practice. The average results of the records are given in Table XXVI.

TABLE XXVI.

Average results of 25 experiments at 9 a.m. compared with 25 experiments at 1 p.m.

	Records at 9 a.m.			Records at 1 p.m.		
Subject.	Total Muscular Perf.	Number.	Average Height.	Total Muscular Perf.	Number.	Average Height.
	Kgm.		Cms.	Kgm.		Cms.
M.	2·26	82·7	1·28	2·17	81	1·27
P.	3·75	146	1·19	4·22	167	1·18
R.	1·96	64	1·58	2·06	64	1·67
B.	2·27	45	2·39	2·30	41	2·62

According to these results, improvement is characteristic of the records at 1 p.m. in all but one subject, this depreciation being due both to the number and to the height. A closer analysis of the actual figures showed there was no consistent tendency in either direction. The number of times that improvement occurred at 1 p.m. was equivalent to 55 per cent. in the case of the total muscular performance and in the number, 60 per cent. in the case of the average height.

It is possible that the muscular capacity as tested by this method is affected by factors other than fatigue. The feeling of relaxation of the school discipline and mental tension is believed to be one of the causes of improvement.

The general conclusion of these experiments is that although the children are apparently fatigued after the school day, no consistent depreciation in quickness and accuracy of perception, decrease in sensitivity, mental ability, or in muscular capacity, could be demonstrated by the selected test.

The experiments were purposely carried over a long period of time, and it is true that cases may be selected which give a decided variation. It is quite possible, however, that these are due to chance, and a closer analysis and comparison with the probable error confirms the supposition that the variations are not sufficiently consistent to justify any conclusion as to the evidence of fatigue.

My thanks are due to the school authorities for their courtesy and kindness in granting facilities to carry out these experiments, and to my sister, Mrs. Reid, for collecting data for me.

THE MEASUREMENT OF INTELLIGENCE.

BINET-SIMON TESTS.

THE tests for the measurement of intelligence designed by M. Binet and Dr. Simon have, as the result of careful trial by the authors and their collaborators, undergone a revision, the main features of which it is the purpose of this article to describe. Certain tests have disappeared; others have shown themselves too easy for the age to which they were at first appropriated, and have therefore been assigned to lower ages; others, again, having been demonstrated too difficult, find their place among the tests for superior ages. Lastly, two new tests have been introduced, one for the age of ten, and one for the age of twelve.

The tests which have disappeared are the following :—the question of age, and the repetition of a sentence of 16 syllables (formerly demanded from the 6-year-old), the question as to number of fingers, the copy of a written model, the repetition of 5 numbers, and the naming of four of the ordinary coins, once forming part of the tests designed for the 7-year-olds. The reading test, with its demand for the recall of a certain number of the facts read, set to 8 and 9-year-olds, has also disappeared, together with writing to dictation and the naming of the days of the week. These tests have been purposely rejected, M. Binet tells us in the "Année Psychologique," Tome xvii, (Mesure du Niveau Intellectuel) for the following reasons :—

1. The test demanding the repetition of 16 syllables set to the 6-year-old child is rejected as being too similar to a test designed for the 5-year-old, viz., the repetition of a sentence of 10 syllables.

2. Knowledge of age, of the number of one's fingers, of the days of the week, is hardly to be regarded as evidence of intelligence; it is rather the result of the information received by the children from those who tend them.

3. Reading, writing from a copy, and to dictation, are pre-eminently scholastic attainments, these tests may therefore be omitted in most cases, since the estimation of the child's stage in the acquirement of these powers must be made by those who are to instruct him.

The tests which have been relegated to lower ages are :—(i) Copy of a diamond shape; (ii) Counting 13 halfpence; (iii) Counting in halfpence; (iv) Naming 4 colours; (v) Exact information as to the day of the month; (vi) Naming all the pieces of money; (vii) Enumerating the months; (viii) Part of the questions involving the use of intelligence; and (ix) Criticism of absurdities. With these changes my own results are, on the whole, in accord. Certainly my 8-year-old subjects found it as easy to compare two objects from memory as to correctly name the colours, if one examines the results numerically, but in the light of experience one's impression was that the naming of the colours was decidedly the easier test. The 12-year-old children, too, more readily furnished above 60 words in 3 minutes than a criticism of absurdities, but the difference in the results was but slight.

Some of the tests clearly proved themselves very difficult for the children of the age for which they were at first intended, and these have taken their place among the tests for superior ages, viz.: (i) Right hand, left ear; (ii) Performance of 3 simultaneous commissions; (iii) Features missing in faces; (iv) Repetition of 5 numbers; (v) Arranging of boxes in order. With these changes my results correspond.

Among the tests for 10-year-olds we have included one which appeared in the 1905 series, viz.: Drawing from memory.

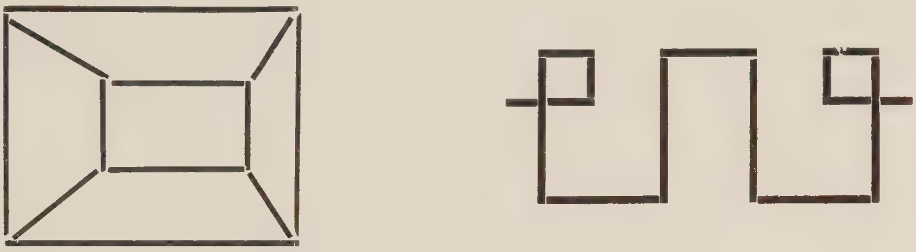

Fig. 1.

The subject is warned that the experimenter is about to show him two designs at which he will be allowed to look for 10 seconds, and which he will be required to draw from memory. The designs, which have been prepared beforehand and are as shown in Fig. 1, are then exposed, and on their withdrawal at the expiration of 10 seconds, the memory drawing is demanded. The attempt is considered to merit the designation + if one of the designs is correct, and the other correct at any rate to the extent of half.

For the 12-year-olds is designed a test of their power of ignoring the suggestion offered by lines. This demands apparatus, a book consisting of six pages of blank white paper. On the first page there must be two lines drawn, in the same line, in ink. One, that on the left, should be 4 centimetres in length, the other, on the right, 5 centimetres, a space of one centimetre should separate them. On the second page there should be two lines similarly drawn, but with this difference, the line on the left should be 5 centimetres in length, the other 6. Again, on the third page there should be lines as above, but in this case that on the left should be 6 centimetres in length, and that on the right 7. The remaining three pages should display lines similarly drawn, but all of equal length, viz., 7 centimetres.

As the first three couples of lines are shown the experimenter asks "Which is the longer of these two lines?" but on coming to the three equal couples he merely says "And what about these." If the subject twice responds of these last "They are equal," he is considered to have accomplished the test.

The revised list of tests, then, appears as follows.

3 Years.

i. Point to nose, eyes, mouth.
ii. Repeat two numbers.
iii. Enumerate objects in a picture.
iv. Give family name.
v. Repeat a sentence of six syllables.

4 Years.

i. Give sex.
ii. Name familiar objects, e.g., key, knife, halfpenny.
iii. Repeat three numbers.
iv. Comparison of two lines.

5 Years.

i. Comparison of two boxes of different weights.
ii. Copy of a square.
iii. Repetition of a sentence of ten syllables.
iv. Counting four halfpennies.
v. Arranging in order the two pieces of an oblong card.

6 Years.

i. Distinction between morning and evening.
ii. Definition by use.
iii. Copy of a diamond shape.
iv. Counting thirteen halfpence.
v. Æsthetic comparison.

7 Years.

i. Right hand, left ear.
ii. Description of a picture.
iii. Performance of three simultaneous commissions.
iv. Counting in halfpence.
v. Naming four colours.

8 Years.

i. Comparing two things from memory.
ii. Counting from 20 to 0.
iii. Features missing in faces.
iv. Exact information as to date.
v. To repeat five numbers.

9 Years.

i. Giving change out of a shilling.
ii. Definition superior to use.
iii. Naming all the coins.
iv. Enumeration of the months.
v. Replying to easy questions.

10 Years.

i. Arranging five boxes in order.
ii. Copying figures from memory.
iii. Criticism of sentences containing absurdities.
iv. Replying to difficult questions.
v. To put three words into two sentences.

12 Years.

i. Rejection of the suggestions made by lines.
ii. To put three words into one sentence.
iii. To say more than 60 words in 3 minutes.
iv. Abstract definitions.
v. Arranging words in order.

15 Years.

- i. Repetition of seven numbers.
- ii. Rhymes.
- iii. Repetition of a sentence of twenty-six syllables.
- iv. Interpretation of a picture.
- v. Problem of incidents.

Over 15 Years.

- i. Cutting out.
- ii. The reversed triangle.
- iii. Differences.
- iv. The question of the President.
- v. Pensée d' Hervier.

KATHARINE L. JOHNSTON.

THE KINDS OF ATTENTION.

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It is hardly necessary to introduce the discussion which follows by conceding to the psychologist that Attention as such is of but one kind, that is to say, is simply Attention. Nevertheless, it is useful for the educational pyschologist, when he investigates the conditions under which we have Attention, to strain somewhat the language of the strict psychologist, and to speak of "kinds of Attention," where in reality it is the sets or groups of conditions that are different in kind.

A classification of the kinds of Attention which has gained wide currency is that developed by Professor Stout in his "Groundwork of Psychology." According to this classification there are two main types of Attention, Voluntary and Non-voluntary, and four sub-types, under Voluntary Attention, Explicitly Voluntary and Implicitly Voluntary: and under Non-voluntary Attention, Enforced and Spontaneous. In its essentials this classification can, of course, scarcely be credited to Professor Stout, but its development in his hands is somewhat notable. However plausible this treatment of Attention may at the first glance appear, it is unfortunately neither psychologically sound nor educationally helpful. It is not psychologically sound because, in the first place, what Stout calls Voluntary is really Volitional Attention, what he calls Non-voluntary is, in the case of Enforced Attention, Involuntary, in the case of Spontaneous, in the highest degree Voluntary, in the ordinary acceptation of these terms, and because, in the second place, Enforced and Spontaneous Attention are really as the poles asunder, and can on no account be regarded as sub-types of the same main type of Attention.

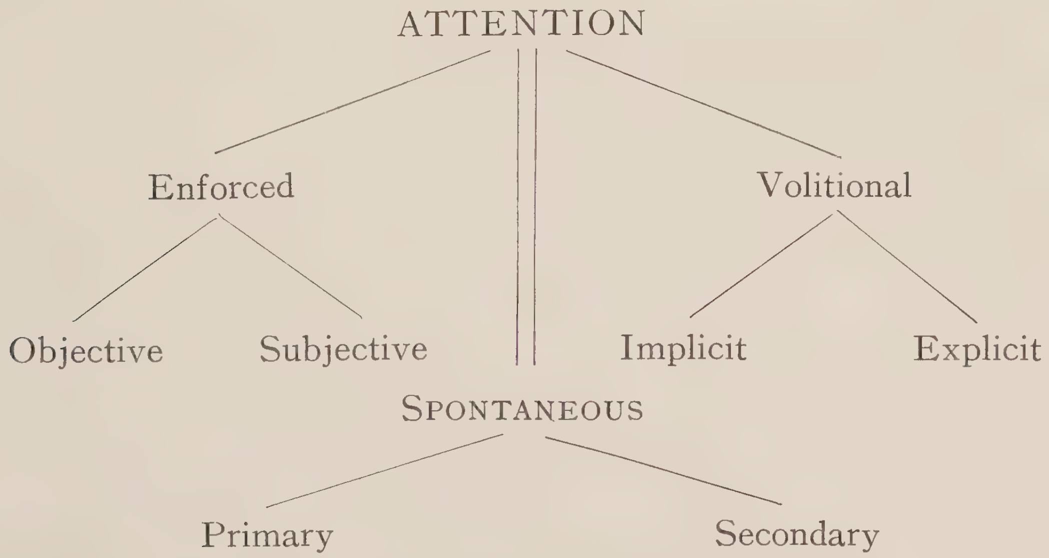
Stout, it is true, himself points out that "volitional" would be the preferable term to use for what is ordinarily called Voluntary or Active Attention. But if so, why does he not employ that term? Surely if "voluntary" is a misleading term, the sooner psychologists cease to use it in this connexion the better, and no one is better fitted to give a lead in this matter than Professor Stout himself. In any case, there is no excuse for calling Enforced Attention "Non-voluntary," when it is precisely what we ordinarily mean by "involuntary," and it seems an extraordinary confusion of thought to classify Spontaneous Attention as Non-voluntary merely because it is non-volitional, that is to say, because there is no express volition to attend. When I read an interesting article by Professor Stout on, let us say "Instinct and Intelligence," my Attention is obviously in the highest degree voluntary, and yet it may just as clearly be spontaneous or non-volitional. Surely there is a wide difference between my Attention in this case and in the case, let us say, of a sudden crash heard in the kitchen, when my Attention is due in the first instance to the brute force of the stimulus, and is therefore "enforced" in the strict sense, or "involuntary" in the ordinary sense of those terms.

Professor Adamson, in his Note on "Attention, entweder willkürlich oder unwillkürlich," in the first number of this Journal reaches a similar conclusion along somewhat different lines regarding the current usage of the terms "voluntary," "non-voluntary," and "involuntary," in connection with Attention.

Educationally, Stout's classification is neither sound nor helpful—it may even be positively harmful. In the first place it seems to imply a chasm which cannot be bridged between Voluntary and Spontaneous Attention. In the second place it also seems to imply a close connexion between Enforced and Spontaneous Attention, entirely conceals their true relation, and may therefore lead to serious errors in practice. Other psychologists, Ribot for example, either obscure or fail to draw this distinction between Enforced and Spontaneous Attention, which, however unimportant it may be for the pure psychologist, is of the very first importance for the teacher.

The defects from our point of view of Stout's teaching are not removed, but rather emphasized, by Stout himself, when he says: "In education, the teacher should, in the first place, aim at making voluntary attention implicit rather than explicit . . . in the second place, the final aim ought to be to convert voluntary attention into spontaneous." With some qualifications, this is of course eminently sound educational theory. The more we have to will to attend the less efficient must our Attention be, for in such cases there is really divided Attention and hence divided energy. There is not necessarily more effort in volitional than in spontaneous Attention, but it is differently directed, and partly for that reason is more felt as effort. The output of work suffers in the case of volitional Attention because, if we may so express it, energy is partly used up in the volition itself. So far, then, Stout's position is educationally sound. The defects appear when we look at the way in which he suggests that this waste of effort may be minimized. In transforming explicit into implicit Voluntary Attention "the selection of motives for attending is important." These should have "as much connection with the subject matter as possible." But in the immediately preceding paragraph Stout implies that Voluntary Attention becomes implicit if the motive for attending is so strong that "self-reminders are unnecessary." There is no word here—and undoubtedly this is psychologically the sounder view—of the motive, for attending being in close connexion with the subject-matter. Further, Voluntary Attention is transformed into Spontaneous "by inducing direct instead of derivative interest in the subject-matter." But this is precisely the way in which Stout has just declared, though in different terms, that explicit is transformed into implicit Voluntary Attention, so that it now seems that implicit voluntary Attention is the half-way house on the road to Spontaneous Attention, and further, that Stout's distinction between Voluntary and Spontaneous Attention has entirely broken down.

Such are some of the difficulties and inconsistencies involved in the attempt to build an educational theory on Professor Stout's psychology of Attention. What classification, then, of the forms of Attention is an educational psychology to adopt? Our criticism of Stout's classification indicates the answer to this question. We must apparently recognize not two, but three main types, a volitional type, a type which is non-volitional but not involuntary, and a type which is both non-volitional and involuntary, or Volitional, Spontaneous, and Enforced Attention. Further, we may, like Professor Stout, divide each into two sub-types, under Volitional, explicit and implicit; under Spontaneous, primary or primitive and secondary; under Enforced, objectively conditioned and subjectively conditioned. We might then have some such schematic representation as the following, to show the relationships between the various types, so far as these relationships can be schematically shown.



By the form of this scheme it is intended to represent the main line of Attention as Spontaneous, that is, Spontaneous Attention as the fundamental type. In so far as there is mental life at all there is Attention—this seems a legitimate and satisfactory interpretation of the position taken up by Professor Ward in his *Encyclopædia Britannica* article—and such Attention must normally be of the Spontaneous type.

We have both in Enforced and in Volitional Attention something secondary and subsidiary, as it were, something added to the ordinary course of the mental life. Enforced Attention is due to what we may figuratively describe as a kind of mental jolt. Ordinarily it occurs when we have a sudden or intense stimulus. But it would be inadvisable to confine the term to sensory experience. When painful thoughts, for example, persist in intruding themselves in spite of all our efforts to get rid of them, we have a kind of Attention which should also be classified as Enforced. Volitional Attention is a modification of our attentive consciousness of a different, and one might say an opposite, kind. It implies an expressly volitional selection of a certain direction of mental activity, a state of conflict between objects soliciting Attention, and the definite identification of the Self with one of the contending sides. The use by some psychologists of "enforced" in this sense is very confusing, and the use of "voluntary" we have already seen to be illegitimate. In explicitly Volitional Attention the conflct still consciously continues or is renewed at frequent intervals; in implicitly Volitional Attention one side is so much in the ascendant that the conflict is only renewed if conditions are so altered as relatively to weaken the volitional element.

There are three points about which the educational psychologist must be perfectly clear: *1.* That there are three, not two, distinct types of attention. *2.* That the fundamental and permanent type is Spontaneous Attention. *3.* That Volitional Attention, which has in the past been almost the only type studied, though important, is of secondary importance, and that, in the words of Ribot, it is "precarious and vacillating in its nature" and "derives its whole being from Spontaneous Attention."

An understanding of the conditions determining these types of Attention and their relation to one another is of the first importance to the teacher. Such an understanding, as far as the needs of educational psychology are concerned, can only be attained from the side of Interest. It is no part of the purpose of the present short paper to enter into a discussion of the psychology of Interest and Attention, but merely to attempt a preliminary removal of some difficulties and obscurities. These cluster round Interest as well as round Attention.

The word "Interest" has become a very confusing term in educational theory owing to the loose way in which it has been and is being used by educational theorists. Take, for example, these extraordinary statements: "Genuine Interest is 'disinterested'; its possessor, however villainous in some matters, does, to a certain extent, lay aside his villainy when indulging his 'Interests.' . . . The word 'Interest' is a word possessing dignity; it suggests elevated pursuits of an intellectual or æsthetic nature, and gives no encouragement to the idea that every crude instinct has to be gratified." These may rightly be called extraordinary statements, not because of the thought—or want of thought—which is expressed, but rather because the writer, while professing to write a text-book of educational science, is so obviously exulting in the nebulosity of his ideas. Is it not more than probable that it is just a man's interests that constitute his villainy? It is indeed a far cry from Professor Stout to Dr. Hayward, but there is no need, nor is this the place, to criticize the latter. The passage quoted affords an admirable illustration of the kind of misuse of terms which educational theory must learn at all hazards to avoid.

Psychologically, Interest may be called the obverse or personal aspect or constituent of a conative process. It is that element of experience in virtue of which a thing has worth or value. It might be, and has been, maintained that Interest and Attention are merely two aspects of the same process. This may be sound enough psychology, but there are two objections to it from the point of view of its usefulness. In the first place, it involves the employment of the term "Interest" in a sense in which the term is not required, "hedonic tone" adequately serving our purpose. In the second place, it leaves us without a special psychological term, where such a term is eminently desirable. We must have a term to express what we may call "the felt value of an end." If we can use the term "Interest" in this restricted sense, and in this sense alone, although such a course may seem somewhat arbitrary, the whole situation, so far as educational psychology is concerned, clears up marvellously.

In popular speech the words "interest" and "interesting" are used in several distinct senses. It can, however, easily be shown that the idea of "the felt value of an end" is fundamental in all. We may, for example, say, (a) "I have, at the present moment, a keen interest in a particular psychological problem"; (b) "I have an interest in psychology"; (c) "Psychology has a great interest for me"; (d) "It is to my interest as a teacher to study psychology"; (a) and (b) may be called psychological subjective senses, (c) the psychological objective sense, and (d) the biological sense of the term. Analysed, (a) means that at the present moment I am interested in the solution of a psychological problem, that is to say, its solution is of "felt value" to me; (b) means that, owing to what Stout would call a psycho-physical disposition, I have a permanent or enduring tendency to be interested in psychological problems, that is "to feel the value" of the solution of such problems; (c) is merely the expression in objective terms of the same thing. These meanings are therefore closely akin to one another; the biological sense is slightly, though not radically, different. When we say it is a person's interest to do anything, we assume in the first instance that something is of value to the person in question, that he desires to attain some particular end, and we imply that the thing in question has some essential relationship to that end, that it is integrally connected with the means for its attainment. Obviously, an end must be "of felt value." Hence, we may say that the individual has a felt need which determines the course of his mental activity in general, or in this particular case, and what it is his interest to do bears directly upon the satisfaction of his felt need, and is his interest simply because of that fact. We imply also that he would be interested in that thing if he saw the connection which really exists between it and his end. The root idea therefore in all these popular senses of "Interest" may be said to be the "felt value of an end."

It is now possible for us to return to the main discussion, the classification of the types of Attention. The "felt value of an end" will evidently depend upon the needs of an organism. These needs may be either primitive or acquired, primary or secondary. We may therefore also classify the interests of an individual as primary and secondary. Similarly, Spontaneous Attention may be either primary or secondary, primary when it is directed towards an object for the satisfaction of a primitive or inherited Interest—what we usually call an Instinct—secondary when it is directed towards an object for the satisfaction of an acquired Interest. Further, Spontaneous Attention, primary or secondary, must always in a greater or less degree characterize mental activity, for mental activity is determined by needs and guided by the "felt value" of ends.

The position that all pursuit of an end is characterized by Spontaneous Attention may at first appear to involve serious difficulties as to the place of Enforced and Volitional Attention, but these difficulties are only apparent. Let us consider first the relation of Interest in an end to Interest in the means for the attainment of that end. The "felt value" of an end passes over into the "felt value" of the means, when that is recognized as really the means for the attainment of that particular end. The means, in fact, becomes a mediate end. When, and in so far as the means is organically connected with the end, and is known to be so connected, the end is so far attained in the means, and known to be attained, and we have Spontaneous Attention throughout the process, through successive means to the ultimate end, unless that end in the meantime, for some reason or other, changes. This is the characteristic condition which we call Direct Interest.

When and in so far as the means is arbitrarily and not organically connected with the end, or, if organically connected, is not known to be so, the Interest in the means must necessarily be Indirect, and in such a case the Attention to the means must be volitional. The determining conditions therefore of Volitional Attention may be produced either where the means has no perceived relation to the end, as, for example, when the end of the child is to avoid punishment, and the means is the learning of a list of dates, or where the end itself has little stability and is, from time to time, displaced by other ends, even though merely temporarily displaced, so that the means loses any organic connection to the present end which it may have had.

With regard to Enforced Attention, it must be noted that it is never more than momentary. The interruption to a pre-existent attention-process, which it involves, either passes immediately or becomes established. Enforced Attention therefore either gives way to Spontaneous Attention or is displaced by means of Volitional Attention. Enforced Attention is not characterized by the "felt value" of an end; it is not "interested" Attention in the strict sense. This is a fact which it would be well for the teacher to keep always clearly in mind. But we must distinguish two cases. Enforced Attention may be due simply to the brute force of a stimulus, on the one hand, and the congenital structure of our nervous system, on the other hand. This we may usefully call *objectively determined*, to distinguish it from another form which we may call *subjectively determined.* In the latter case we have the familiar experience of worrying and annoying—or the opposite—thoughts persistently interrupting the desired line of activity, the realization of the present end. Here the Enforced Attention is determined by a psychophysical disposition, by an Interest, though not by the *present* Interest.

There are a few observations which may be made in conclusion. It will be evident from the preceding analysis that Spontaneous Attention is practically always present, which as we have seen, is also Ribot's view. Further, Enforced and Volitional Attention are characteristically found in immediate contiguity to one another. The sub-types under Volitional Attention cannot be separated by any hard and fast line. When the spontaneous element is relatively weak we have explicitly Volitional, when relatively strong, implicitly Volitional Attention. Volitional Attention, *qua* Volitional, is determined by Indirect Interest, but there can be no Indirect without Direct Interest. The teacher has really two main problems in connection with Attention. In the first place, Volitional Attention means control, and the power or the habit of Volitional Attention must be developed. In the second place, and more important still, Volitional Attention and Indirect Interest must be utilized in such a way that the child may attain finally Direct Interest in, and Spontaneous Attention to, the subject-matter of instruction, or the work in hand, whatever it may be. It will depend on the *strength* of the determining motive, whether Volitional Attention is implicit or explicit. But it will depend on the *kind* of determining motive selected, whether the Volitional will pass into the right direction of Spontaneous Attention, the Indirect into Direct Interest.

A NOTE ON BACKWARD CHILDREN.

WHILST a great deal of energy is being misspent in wrongly-directed effort to educate mentally deficient children whose social value must in the great majority of cases be something less than zero, we have been in this country content to let the problem of the backward child remain with the struggling teacher, who can, in general, do nothing more for him than insist upon his repeating the meaningless grind at which he has previously failed. Many continental cities have, under the inspiring lead of Mannheim, adopted special methods of dealing with the problem which deserve the close attention of our educational administrators. That the difficulty is one which calls for such attention will be clear from the examination of the statistics of any Local Education Authority which gives the number of pupils under instruction in the various standards at the beginning of the school year.

To take Sheffield figures for *provided* schools as an example. The table shows the total number of boys and girls respectively in the various standards of the primary schools during the last three years for which returns are available. They refer in each case to the beginning of the school year.

TABLE I.

	I.		II.		III.		IV.		V.		VI.		VII.		VIII.	
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.
1908	4388	4163	3906	3972	3589	3582	3263	3418	2993	2878	2567	2297	1225	1072	335	197
1909	4273	4276	3997	3851	3551	3719	3292	3248	2973	2961	2451	2377	1559	1201	454	275
1910	4385	4168	3823	3662	3680	3815	3264	3485	3197	2876	2603	2411	1441	1200	477	302

Two things stand out from a study of this table. First, the steady drop in the figures as we read from right to left. The numbers for Standard II, for example, are very much lower than those for Standard I. Even at this early age, a great many children seem to drop out in the onward movement. To compare the same generation of pupils we must of course read the table diagonally, and put the Standard II figures for 1909 and the Standard III of 1910, against the Standard I figures for 1908. In that interval of two years there are no fewer than 708 boys to account for. Many of these were probably still in Standards I and II, helping to swell those numbers unduly. The same tale is told by comparing Standard III of 1908 with Standard IV of 1909, and Standard V of 1910, though for obvious reasons in less emphatic terms.

The extent to which backward children complicate the problem of the class teacher comes out more clearly from the next table, showing the number of children in the various classes of the same schools who are two years or more behind the great mass of their contemporaries.*

	I.		II.		III.		IV.		V.		VI.		Total.
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	
1908	162	136	315	414	325	512	404	520	163	175	10	12	3148
1909	118	99	281	280	393	428	374	396	188	169	22	13	2761
1910	134	133	237	220	368	408	348	413	160	131	26	12	2590

These figures represent between 5·5 and 6·5 per cent of the total number of children in those standards actually in the schools.

It will be remembered that Galton's enquiry showed that out of a million children 7·72% were distinctly under the average in native capacity, not including ·27% who were mentally deficient. To take actual standing in school as a measure of capacity would be misleading however, as irregularity of attendance probably accounts for much of the retardation. On the other hand, two years backsliding is a severe test. Many children considerably below the average in native ability, manage by attending school regularly, at least to keep within one year of the normal position of children of their age. Mannheim statistics for 1900-1904 show that 13% approximately of the children fail to keep step with the ordinary school promotions, and need the special assistance of their system of repetition classes.†

Our attitude towards the problem of the backward child depends very much upon our view of the function of the school, and the finality of its present form. If the school ought to fit the child it is clear that, in many thousands of cases, what ought to be and what is, are poles asunder. Children who fail to get promotion are, in a large number of cases, failures because the machinery of the school is not suited to them. Properly approached, they are educable. Herein lies the distinction between them and the mentally deficient. The children in the latter case are, broadly speaking, from the outset hopelessly ineducable; the much larger class of backward children contains valuable social material for which our present school methods are unsuited. Are not these children, who leave school already branded as incompetent, the source of many of our social difficulties? J. A. G.

(To be continued.)

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*A word should be said as to how these figures are arrived at. The returns give the number of children in each Standard under 8, between 8 and 9, 9 and 10, and so on. Thus in Standard I, Boys (1908), there were—

Under 8	3799
Between 8 and 9	427
Over 9	162

I have drawn the line for Standard I therefore below the "between 8 and 9" figures; for Standard II below the "between 9 and 10" figures; and so on up the school. It is obviously only a rough and ready method of getting at the facts

†In a paper by Dr. Tredgold, which the author kindly sent me after this note was written, the following figures for English areas are given on the responsibility of their respective Medical Officers:—In Staffordshire, 5%; Surrey, 5.5%; Guildford, 4%; Brighton, 12.6% fall within the category of dull and backward. What precisely were the tests applied is not stated. Dr. Tredgold's paper, published in *The British Journal of Children's Diseases*, is an interesting contribution to the whole subject.

THE CREATION OF A MEMORY.

By Professor E. P. CULVERWELL, Trinity College, Dublin.

A youth, whose father was a very intimate friend of my own, stayed with me for some two months while he made up the work, especially the Latin, for the First Term Examination in Trinity College, Dublin, the regulations not requiring him to sit for the Entrance Examination. He was much above the average in mental equipment, especially in English and Science. He had as a boy written a really good essay on the care of animals, and gained one of the highest prizes awarded by a Provincial branch of the Society for the Prevention of Cruelty to Animals; he was full of intellectual interests, and could express his thoughts with quite remarkable facility in English. Of Latin he could make no hand, but he had done excellent work on the Science Side in one of the best English public schools, where he had been set to work at Physics and Chemistry in consequence of his failure to achieve any measure of success in Latin, of which he could not remember either the grammar or the meaning of the words. The same difficulty had been previously shown in an excellent Irish school, in which he had been a day scholar, before going to England. He was kept at the English school till he was past eighteen and a half, partly because he had there such an inspiring Science master, partly in the hope of strengthening his Latin sufficiently to pass the Trinity College examination, and for the last School Term he was under the Head Master's special care in Latin. On coming to Dublin he was placed, as a private pupil, under the best teacher known to me for pupils rather backward in Latin—the set course was two books of the Odes of Horace. For a little while he believed himself to be making much better progress with the private coach than he had in the past, but after a little time he told my wife that it was the old story—no matter how carefully he made up an ode he had forgotten both the translation and the parsing in a week's time.

Here was clearly a subject for psychological observation, and perhaps experiment. A youth who always did well on a general-information paper, whose mind was much above the average in regard to his native language, who was keenly interested in Natural Science, and whose memory in regard to these subjects was excellent, was a dismal failure in Latin. It was not that he did not try. He made strenuous efforts; he was most anxious to succeed, and he gave all the attention he could, and nearly all his time, to the endeavour to master the Odes. Was the different mental attitude towards these different subjects due to inherent quality, and thus unalterable, or was it due to some accident of environment, and therefore remediable?

Endeavouring to solve this problem, I sat beside him for about half an hour one evening while he was making up his work. He had a dictionary, a grammar, and a rather free translation at hand. He read the Latin silently to himself and translated it silently. Beyond looking in the dictionary or grammar, there were hardly any outward signs of work, except the shift of the eyes as they turned from one word to another, and a very slight occasional movement of the lips. On the other hand, his attitude denoted plenty of mental effort and sustained attention.

The attention not being at fault, the one possible remedy was to increase the physiological modifications of nerve substance on which memory depends. Accordingly I suggested to him many more significant actions—to read the Latin words aloud and very distinctly, to say the English words, to say aloud all the grammatical explanations, as well as the verbal translations, in passages where he had found more than ordinary difficulty, to write these things down and interline them with their English translations and with abbreviations to indicate the constructions and the rules on which they depended, and in all such cases to say aloud each word as he wrote it, and, above all, to attend to what he was thus doing, to write with care and to study what he wrote with the eye, and to speak each word carefully and to listen to its sound, not, however, letting the attention dwell on it as an isolated word or sound, but always regarding it as in its relation to the rest of the ode. I warned him that at first it would be very laborious, and take a long time, to make up even a single ode in this elaborate way, but encouraged him to hope that all this would be but a scaffolding which he could discard when he had built up a familiarity with Latin; and I ended my homily by reiterating that half his trouble would be lost if these separate acts were wholly separated in thought—that though the acts were to be done with attention, yet the attention must not be wholly concentrated on the acts themselves, but must regard them as in their relation to the Ode, so as to bring them into such close relationship with the whole and with each other that each would tend to recall the other and aid in the memory of the whole. I also asked him to say nothing to his grinder, but wait and see whether any change was observed by him.

The experiment succeeded beyond all expectation. The student never had to do the full measure of the suggested actions in regard to any complete verse of any Ode, though he did it in regard to many individual words. When a week was over he had not forgotten the ode done that evening; nor when a fortnight was over. Soon after, his grinder remarked that he was getting a grip of it. A little later on, the student told my wife that tags of Latin lines were beginning to come into his ears of themselves. Later still, when he had formed a Latin nucleus, as it were, in his mind, he reverted to his own early methods, having passed beyond the stage in which he needed to do many *acts* in order to learn and remember, and then he told her that he was beginning to be quite sorry he hadn't taken up Latin as one of his subjects, and wasn't sure that he would not have liked it better than his favourite Science. And at the examination he got 60 % in the written paper and 60 % in the *vivâ voce* in the Odes.

The sequel afforded a test which I had never anticipated. Owing to a change of plan, this examination was not counted as a Term examination, and he had to pass in the same subjects nine and a half months afterwards. He said he was sure he knew this part of his work quite well, and, in fact, he only read the Odes over once again three days before the examination, and his marks were 60 % and 50 % on that small amount of reading, thus proving how thoroughly the work had been remembered.

"CHILD-PLAY,"

OR

"The Sorrows of a Mistress of Method."

("The Essence of Play is Self-abandonment.")

Persons in the play: The Teacher.
The Class. Standard I, Mixed—about 50 children.

Scene: ... ... An Infant School in the heart of a city.

The Teacher. (The brisk, omnipresent type, whose manner recalls now an auctioneer, now a revivalist preacher, now a drill sergeant of the territorials.)

"Ready, children. Hands on shoulders! Up! Shoulders! Up! Out! Shoulders! Clap! A - - - way!! (*pause*) Now we're going to have a *love*-ly game. Wouldn't you like to play a game?" (*Hope springing eternal in the children's hearts, they nod furiously.*) "But first I want you to tell me — You all have dinner, don't you? Now what do you do when you get your dinner?" (*A momentary silence,*)

1st child. "Eat it, teacher."

2nd child (*piously*). "Please, teacher, say thank you, teacher."

3rd child (*communicatively*). "Please, teacher, *we* 'ad sausage and mash." (*This answer incites the rest of the class to give their dinner experiences.*)

4th child. "*We* 'ad per - taters."

5th child. "*We* 'ad h'ash." (*A babel of menus follows*).

Teacher (*clapping her hands*). "Silence! Hands down! all of you. Hands on heads! Shoulders! Up! Shoulders! A - - - way!! (*pause*) Now one little boy says he *ate* his dinner. Now, *how* did he eat it? Well, Gladys Gibson?"

6th child. "With 'is mouth, teacher."

7th child. "With 'is knife, teacher."

Teacher (*raising horrified hands*). "Not with his *knife*, Tommy. You mean with his —? What does Tommy mean, children?" (*Tommy reiterates clearly* "*his knife*.") "His *spo - on* - - - doesn't he? *G - ood* little children don't eat with a knife."

7th child (proudly). "Please, teacher, *my* father does."

Teacher (taking no notice). "But now, children, what do you do with your dinner when you get it in your mouth?"

1st child. "Please, teacher, it falls down inside yer."

2nd child. "Please, teacher, yer swallers it."

Teacher. "*G - ood* little boy. Yes, you swallow it. Now *(becomes breathlessly impressive)* we're going to play a game about a lit - tle *b*ird called - - - a - - - a - - -, *(sternly)* come now! *(silence)* called a - - - *s - w - allow*. Now, which of you have ever seen a *s - w - allow*? *(No answer.)* Not seen a swallow! I'm sure you have. (*Becomes indignant at the absence of response.)* Come now! children. Attend!! *(Very slowly and emphatically.) Which* - of *you* - *has ever* - *seen* - a - *s-wallow*? *(Pause - silence - Teacher restrains her exasperation and continues in a "last straw" voice)* Now, children, I'm not going to say it again, (*pause*) W - H - ICH - OF YOU - HAS EVER - SEEN - a S-WALLOW? (*swoops upon one unfortunate*) Maggie Parkins! Yes, *you*. Haven't *you* ever seen a swallow?"

Maggie (*half dead with fright, whispers*) "Yes, teacher."

Teacher (*her equanamity quite restored*). "*G - ood* girl, Maggie. Now what was it like? (*Maggie puts her pinafore in her mouth and shakes her head.*) What, Maggie, have you forgotten? (*Cheerfully to the class*) Why, Maggie has forgotten what her swallow was like. Well now, children, Listen! (*Her voice becomes suddenly hushed and sentimental.*) When the *beau* - tiful Spring comes — and the cold, cold days go, the s - wallows come — before *any* of the other birds, — *ev*-er so long before — to tell us that the Spring is coming — and there won't be *any* more snow, or rain, or *any* - thing — and they come *fly*ing over the sea — Oh! ever so quick! — such a *long*, *long* way over the sea — And then the d*ea*r little flowers pe - ep up their heads. (*Resumes her briskness.*) Now, all make the flowers peep up through your hands — like this — Pe - ep! (*Children begin to imitate*) Hands a - *way*!! Billy Simpkin, what are *you* doing? (*Swoops behind and seizes a red-faced boy by the head, drags him to the front, and plants him with a pat, going on at once.*) And the s - w - allows twitter, twitter — like this, (*makes a weird, rook-like noise in her throat.*) Now *all* do it (*discordant sounds from the class*). Now — stop! (*claps her hands frantically.*) Be *qui*et all of you — Stop!! (*pause*) Now who who would like to be swallows?"

(*Babel ensues, children holding up waving hands and calling out, several even rushing up to the front. Teacher claps her hands, at first in vain*). "Back to your places! Children! What *are* you doing? Back! Sit down!! All sit down! (*Pause, teacher folds her arms and assumes a sorrow-stricken voice.*) Now, children I can't have this noise. You must be swallows quietly. How can I have children for swallows who can't sit still! Bessie McHaffie there, you're sitting beautifully — such a good girl, Bessie! *She* can be a swallow. (*All the children immediately assume the shape of pouter-pigeons, their muscles at breaking point, their faces fixed in desperate virtue.*) Well, Archibald Johnson, Evelina Wigglesworth, Mary Jane Jones, Aphrodite Smith, Reggie Bucket, — Katie, you, — May Higgins, and you five on that row, now you can be swallows. Swallows, *stand!!* right about, turn! (*Claps her hands.*) March! one, two, three, four. (*Reggie Bucket begins fluttering.*) *Be qu*-iet! Reggie Bucket, you're not to begin being a swallow till I tell you. (*Goes to the cupboard for her Recitation book.*) *I* can see you, Charlie Smith. (*Returns.*) Now, children, listen. Eyes — on *teá* - cher! On — *cei*ling! On *teá* - cher!! No, Carrie Winterbottom, (*sarcastically*) teacher's not out of the window. Ready! Hands — a - - - way! (*Resumes the sentimental voice. The movements of her jaws and lips would satisfy the most infatuated of phoneticians, not a consonant escapes her.*)

The *s-w*allows come *s-k*imming a*c-r*oss the *w*ide *s*ea,
They are *b-r*inging a *m*essage to *y*ou and to *m*e,
That the *beau*-tiful *S-p-r*ing comes *tri*p-ping along,
All *d-r*essed up in *G-r*een and *si*nging a *s*ong,

(*Pauses to point to one of the class—glaring. The children in front look round to discover the delinquent.*)

Eyes on me!

Then *L*-ea*p* up the *L*-ambs, and ou*t* *peep* the *fl*owers,
And *d*own come a-patt'ring the *A*-p(e)ril *sh*owers.
The *W*-ind makes the *t-r*ees *b*ow down at S*p*ring's *f*eet,
Till they *s-m*ell the *s-m*ell of the *Vi*-olets *s*-weet.

Now, I've got the swallows, I shall want the Spring. Now who'll be Spring? We shall want a n*i*ce little girl. Bessie Trotter, *you* come out. (*B.T. comes to the front.*) Now you'd like to be the be*au*tiful Spring, wouldn't you?"

B.T. (*enthusiastically*). "Yes, teacher."

Teacher. "Very well. (*Suddenly.*) No. *You* won't do—You haven't got a green dress. Go back (*spins her round by the head*). Here, Miriam Myers, you'll do. Mind you sing. (*M.M. begins to sing.*) *No!* Not till I tell you. Now I want some lambs, some nice, woolly, white lambs. Here! Bob and Lennie Simpkins, and Martha Thomas, Sybil Love, and Peggy Topp. Now what have *you* got to do? 'The Lambs L--eap up?' Yes, leap! *No!!* (*stamps*) don't begin yet. Now, the flowers. Clara Baker, Ruth Chandler, Billy Carter, Charlie Smith, Sally Goddard, and Percy Tucker, you stand there. (*Drives them to the side of the room.*) What must *you* do? Now, don't be stupid.—Yes?—What?—*PEEP*. Mind you Peep when I tell you.—And *not* before, Charlie Smith. Now who'll be the wind? (*Hands go up eagerly.*) We must have a *BIG, STRONG*, Boy. Jimmy Mackintosh! yes, *you*. You're sitting up nicely. Now all the children, on that row of desks, come out! What a noise! Be q*u*iet! (*Claps.*) Now march! one! two! three! *You* can all be trees. When the strong wind comes behind you, you bow down. I haven't told you yet, Jimmy Mackintosh. Now, let me see 'The wind makes the trees bow down at Spring's feet, Till they smell the smell of the violets sweet.' We shall want some violets—some dear, little, shy violets. Well there's just you six left. Come out all of you. Bob Meadows, come along. (*B.M. shakes his head.*) Oh, well if you won't play, you shall stay there and be a rude little boy, all alone. You five others can be violets. Now look alive! Frankie Jones and Rosa Summers, you lie on the floor there under the trees. If you kick Rosa, Frankie, you shan't be a violet.

Now, you're ready. When I count three, begin to play the game, (*claps*) one, two, three! Now, swallows!! What *are* you doing? You've got to skim—like this (*runs along the floor with out-stretched arms, stumbles over a form and almost comes with her full weight to the ground.*) Now,

'The swallows come skimming across the wide sea.
They are bringing a message to you and to me,'

Now, Spring! Where are you? Don't go to sleep.—But you must sing and trip—like this—Louder!—shout out! Now Lambs! you're not leaping—Leap! Higher!! Higher!! That's not half high enough. (*Stamps her foot*) STOP leaping, Lennie Simpkins, if you can't leap properly. And the flowers—Look here, Billy Carter, you're a flower, not a lamb."

B.C. (*puts his hand up mechanically as he speaks.*) "*Mayn't* I be a lamb? I want to jump."

Teacher (*shakes him*) "Didn't I tell you to be a flower! How do you think we're going to play if you don't do what I tell you. Go back and sit in your desk, and now, Bob Meadows, you'll have another rude little boy to keep you company. Now, flowers, *PEEP!* No, *you* ought to be lying on the floor, Ruth Chandler. Let me see—Oh! I've forgotten the Showers. Two of you swallows come here and be showers. Yes, you two. Now patter with your hands—like this—Harder! harder!! Here, Aphrodite Smith, you stand on teacher's chair—then you'll be big enough to patter on the trees:

'When the wind makes the trees bow down at Spring's feet,
They smell the smell of the violets sweet.'

Now, Jimmy Mackintosh, you're the strong wind, what have you got to do? Yes, make them bow down. No! *don't* knock them over. (*Howl from a tree who falls prone on a violet—a scrimmage ensues.*) Get up!! Patrick Logan (*shakes one of the trees*), you're crushing a violet—Here, don't cry, Rosa; you'll have to go into the babies if you cry. Now, Aphrodite Smith, I told you to *patter* on Willie Black, *not* to bang him on the head—Come off that chair. Now, trees, you've got to smell the violets. Put down your heads, violets—Now smell! Trees. Harder! harder!! Here, Hughie White, why aren't you smelling Frankie Jones? (*Pause, wipes her face.*) Now you all know what you've got to do. Let's begin again. Now, swallows, (*sings the first two lines*) you keep on skimming. Come along, Spring, quick!! Do look more cheerful and sing. Now bow down everybody. (*Two swallows, having collided in their skimming, engage in a wrestling match.*) Here!! Archibald Johnson and Reggie Bucket, (*wrenches them apart—they menace each other from afar*) you can't be swallows any more. Fancy swallows fighting! Both stay in when the bell rings. There it is! Now all stop (*claps hands—two of the lambs in the raptures of leaping fail to hear*). Here, you Billy Simpkins and Peggy Topp! (*Seizes them by the heads.*) What are *you* doing?"

B.S. "Please teacher, we're lambs, leaping."

Teacher. "Now, *did* I tell you to leap, when the bell has rung? Stop in five minutes after play. Back to your places! *(Claps.)* One, two, three, Hands a - - - way!! *(Pause.)* Now, you've had a *love*ly game, haven't you? And you'll all remember to look for a *sw*allow on the way home."

Bob Meadows (who wouldn't play). "I see'd a swaller on a telegraph wire once."

Teacher. "Nonsense, Bob Meadows. *You're* a very rude little boy, who doesn't want to play. Birds live in trees. Now, next time you children see a tree, you look in it for a swallow. Stand, turn, march! *(claps, children march out).* FINIS.

CURRICULUM FOR TWO-YEAR TRAINING COLLEGE STUDENTS.

Training College Association.

Report of Committee appointed at the Annual Meeting of the Association, December, 1910.

FIRST REPORT.

(*Circulated to Members of the Association early in June, 1911, with a request for comments.*)

§ 1.—The resolutions passed at the Annual Meeting, after papers had been read by Professor Adams, Miss H. Brown-Smith, and Mr. A. W. Reed, and a discussion had taken place on "The over-loaded curriculum, and how to lighten it," were as follows:—

(i) "That in the opinion of this Association the division of the attention of students taking the Two-Year course in a Training College among so large a number of subjects as at present is the reverse of educational; that the number should therefore be reduced or re-arranged with a view to the more thorough study of those which are retained."

(ii) "That a committee be appointed to draft a scheme for an amended curriculum, and to report to a special meeting of the Association, summoned for the purpose, at a date to be determined by the Committee of the Association."

(iii) "That the Committee do consist of the officers*, Miss Luard, Mr. A. W. Reed, Miss H. Brown-Smith, Miss Dunlop and Miss Hale, with power to add to their number."

The following additional members were co-opted at the first meeting of the Committee :—Miss Bishop, Rev. R. Hudson, Rev. A. R. Whitham, Canon Rowe (who, however, declined the invitation to serve on the ground of inability to attend the meetings).

§ 2.—The Committee have taken as their starting-point the principle embodied in the first of the resolutions set out above, viz., the need of more concentrated study if students are to gain full benefit from a Training College course.

At the same time they realize that, as the business of the Training College is to turn out practical teachers, and the practical teacher must, as a rule, be qualified to deal with all the ordinary subjects of the Elementary School curriculum, no very drastic reduction in the number of subjects touched on in his course of training can be contemplated at present. The solution of the problem therefore seems to them to lie only *partly* in reducing the number of subjects, partly in a modification of the method of dealing with some of them (see § 3), and partly in a redistribution of them over the two years of the course (see § 6).

§ 3.—In the table of subjects given below, the three heads ("I," "II," and "III") correspond roughly with what Professor Adams, in the paper read by him at the annual meeting of the Association, described as the "Academic," the "Semi-professional," and the "Professional" subjects respectively. The "Academic" subjects are those taken primarily with a view to the student's own mental development, and the overloading of the curriculum, of which so much complaint is made, appears to the Committee to be due not only to the attempt to teach too many subjects at the same time, but also in a large measure, to the attempt to teach too many subjects "academically." In the Committee's scheme it is expressly provided, under Head III, that "more time than at present [should be] given to the study of 'Special' method, *which should include all the ordinary subjects of the elementary school course*." If the study of "Special Method" be widened to this extent, it is believed that the "academic" study of three of the subjects under Head I will amply meet the average student's needs, and that the opportunity thus gained for more concentrated study will be an immense educational advantage.

Of the subjects grouped under Head I, the Committee propose that English alone should be compulsory, the remainder (subject to certain restrictions) being alternate subjects.

§ 4.—The extra stress laid on "Special Method" and the extra time which the Committee believe to be needed in most cases for practical teaching, will necessarily encroach to some extent on the hours at present spent either in "academic" study (Head I) or on the "semi-professional" subjects (Head II). In the case of the weaker students, the time devoted to "academic" study will, no doubt, have to be curtailed; but the Committee trust that there may be many exceptions to this course. Some improvement in the teaching of such subjects as Music, Drawing and Manual Work may surely be looked for in the Secondary Schools; and this, combined with the tendency (gradual as it is) towards a certain degree of specialization among teachers in Elementary Schools, will shortly, they believe, make it possible to exempt many students—especially those destined to teach in large town schools—from one or more of the "semi-professional" subjects. Their scheme requires that *at least two* such subjects be taken by every student. They do not propose to restrict students to two; but they look forward to the time when that may be the normal number, except in the case of infant and junior school teachers, many of whom will doubtless prefer to take as few "academic" and as many "semi-professional" subjects as possible [See footnote on A. I. (*c*) of the Recommendations.]

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* The Officers are Mr. Loring (President), Prof. Adams and Miss Manley (Vice-Presidents), Mr. Salmon (Ex-President), Mr. Griffiths (Secretary).

§ 5.—The Committee earnestly hope that the proposed re-arrangement of subjects, and the reduction in the number under certain Heads, will result in the attainment of higher standards; and in the case of students of good ability it must undoubtedly have that effect. It appeared, however, in the course of their deliberations, that at some of the colleges the weaker students suffer not merely from the dissipation of their mental energies but also from positive overstrain, and in their case an actual lightening of the burden, and not merely a redistribution of it, is required. It was strongly felt by several members of the Committee that students need differentiation into at least two classes, and that, to meet the needs of both two separate standards, an "Elementary"* and an "Advanced" (the Elementary* being approximately that required at present by the Board of Education in the case of compulsory subjects), should be officially recognized in most subjects of the course. The Committee have recommended accordingly.

§ 6.—The adoption of the Committee's recommendations as to the distribution of the Board's Examination between the First and Second Years of the course [would], they believe, give substantial relief to students, and at the same time promote elasticity in the arrangement of an individual student's course. It would put an end to the duplication of examination which at present occurs whenever a student takes any subject both as part of the ordinary course and as an "Optional" subject; and it would enable students to "clear off" more subjects than at present at the end of the First Year, leaving them free to concentrate their attention more effectively than at present in the Second. The Committee anticipate that, from the point of view of "lightening" the curriculum, this may prove to be one of the most useful provisions of the scheme.

§ 7.—The scheme is contained in the Recommendations set out below. The Committee do not venture to suggest that it meets all difficulties experienced by the various types of student and of college. But they have constantly borne this variety of type in mind, and have endeavoured to make their scheme sufficiently elastic to meet all needs. Experience will best show where it needs amendment. They believe that its adoption by the Board of Education would be at least a step in the direction which the anthorities of nearly all Two-Year Colleges desire; and they venture to hope that, even in the event of considerable difference of opinion on matters of detail, the opportunity for united action on the part of the Association (which cannot but have an important influence on the Board) will not be thrown away.

Signed on behalf of the Curriculum Committee,

25th May, 1911. W. LORING, Chairman.

(*Here followed the Recommendations, which are now printed, in a revised form, on pp. 168 and 169.*)

SECOND REPORT.

The Report of the Curriculum Committee, printed above, with its Recommendations, was discussed at length by the Committee of the Association at a Special Meeting held on 26th June, 1911, a summary of the written comments on the proposed scheme (received from a number of members, and also from the "London Branch," of the Association), having first been read.

The document was, on the whole, very favourably received, even those members of the Committee of the Association who saw no urgent need of change being willing to support the proposed scheme (subject to certain amendments) in consideration of the elasticity which is one of its most conspicuous features. All the amendments suggested either related to matters of detail, or had for their object a yet greater elasticity. How little the principles underlying the scheme are affected by these amendments, is shewn by the fact that the First Report of the Curriculum Committee (reprinted above), is as applicable to the revised recommendations (printed below) as to those with which it was originally circulated. With one slight exception all the amendments have been adopted by the Curriculum Committee, and are embodied in their revised scheme, for which, having regard to the following Resolution, passed *nem. con.* at the conclusion of the meeting of June 26th :—

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* The term "Pass" was substituted for the term "Elementary" in the final revision of the Recommendations by the Training College Association (see below).

> "That the Committee of the Training College Association are prepared to approve the recommendations of the Curriculum Committee, subject to the adoption of the suggested amendments"—

the Curriculum Committee venture to hope that they may look for the Association's support.

In addition to recommending the amendments now embodied in the scheme, the Committee of the Association suggested that the Curriculum Committee, in any further report, should lay more stress than they had hitherto laid on the great latitude which the scheme allows to the authorities of individual colleges in framing their own curricula It is not intended that all the subjects mentioned in the recommendations should be taken at every college. Nor is it intended that any student should be at liberty (subject to the recommendations) to determine his own course of study and examination without reference to his Principal or Tutors. The recommendations are intended as an outline to be laid down by the Board of Education, and to be filled in (subject to the approval of the Board) *by College authorities.* The Curriculum Committee have added a new paragraph ("G") in order to emphasize this point.

At the same time they venture to hope that, if their recommendations be adopted, the outline will be filled in, as a rule, in such a way as (*a*) to carry out the principle of "concentration" to which they attach so much importance, (*b*) to allow a very considerable liberty of choice to individual students.

10th August, 1911. W. LORING, CHAIRMAN.

RECOMMENDATIONS.

(In the form in which they were finally approved by the Training College Association, 13th October, 1911.)

A. That as a rule, a Two-Year Student's course should consist of the following subjects:—

I.—(*a*) English Language, Literature, and Composition.

(*b*) Either History, *or* Geography, *or* Mathematics (which may include Arithmetic).

(*c*) One or more* of the following alternative subjects:—

History (if not taken under (*b*) above).
Geography (,, ,, ,, ,,).
Mathemathics (,, ,, ,, ,,).

†Applied Mathematics.
†Physics
†Chemistry.
} or other approved Science.

†Latin.
French.
German.
} or other approved Language.

II.—Two or more of the following:—

Music (Theory and Practice).
Drawing.
Manual Work (in the case of women, Needlework, *or* other Manual Work, *or* both combined).
Nature Study, *or* General Elementary Science, *or* a combined course.

(*Provided that all students must shew enough proficiency in Drawing and Manual Work to illustrate their own lessons.*)

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* The case of students (e.g., Infant and Junior School Teachers) who may be advised by their College authorities to omit all subjects under sub-head (*c*) is covered by the words "as a rule" in the introductory sentence.

III.—Principles of Teaching (more time than at present being given to the study of "Special" Method, which should include all the ordinary subjects of the Elementary School course).

‡ Practical Teaching.

‡ Reading and Recitation (including the principles of Voice-Production).

Physical Training, with an elementary knowledge of the laws of health.

B. That in each of the above subjects, except those marked with a † or a ‡, two standards, viz., "Pass" (representing the general course), and "Advanced" (representing a special or advanced course) be recognised, and Pass and Advanced examinations (or, in the case of "Inspected" subjects, inspections) held. That the Pass and Advanced standards be approximately those at present required by the Board of Education in the case of compulsory and "Optional" subjects respectively; and that the syllabuses of the Pass and Advanced courses be so related that the latter grow naturally out of the former.

C. That, in the case of subjects marked with a †, the only standard be the Advanced standard.

D. That, in Pass subjects, a mark of "Merit" be obtainable, and that in Advanced subjects a "Pass" mark or a mark of "Distinction" be obtainable.

E. That in the subjects which are tested by written examination (except Principles of Teaching), college authorities have the *option* of presenting any student for Pass examination at the end of the First Year; Advanced examinations and all examinations in Principles of Teaching being held at the end of the Second Year only.

F. That students be differentiated during the First Year; and that those taking any subject to the Advanced standard may be exempted from the Pass examination in that subject.

G. That, within the limits indicated by the above Recommendations, the greatest possible latitude be allowed to the authorities of individual Colleges in framing their own curricula, in deciding what options be allowed to their students, and in the division of the Examination between the First and Second Years.

Minutes of Committee Meeting held on October 13th, 1911, at the National Society's House, Westminster.

The following signed the attendance roll:—Mr. W. Loring (President), Miss Luard, Canon Stevenson, Mr. I. B. John, Rev. S. Blofeld, Mr. A. Burrell, Canon Dennis, Canon Martin, Miss B. Forth, Miss S. Young, Miss M. Birch, Rev. I. A. Smith, Rev. H. A. Bren, Mr. F. G. Perrins, Mr. W. T. John, Miss M. Liberty, Mr. A. A. Cock, Rev. V. W. Pearson, Mr. H. S. Cooke, Miss L. M. Hardy, Miss A. L. Wark, Miss J. M. Dunlop, Miss M. M. Allan, Miss D. Frood, Miss A. E. Varley, Miss A. Lloyd Evans, Mrs. Bannister, Prof. J. A. Green, Miss A. Hague, Miss A. F. Dodd, Mr. D. R. Harris, Miss C. M. Webb, and Mr. H. E. Griffiths (Secretary).

Apologies for absence were received from Miss Christopher, Mr. F. J. W. Crowe, Mr. J. H. Gettins, Miss Hale, Mr. D. Salmon, Rev. J. R. W. Thomas, Rev. Preb. E. Hobson,

(1) The Minutes of the last Meeting were read and confirmed.

(2) The President announced that the Report of the Curriculum Committee had been adopted (with a few alterations in the details) at the General Meeting held in the morning. It was decided that the Report be sent to the Board of Education.

(3) The following nominations were received for 1912.—For Vice-Presidents, Miss Graveson (Goldsmiths' College); Miss Lloyd Evans (Fulham College); Miss Walker (Southlands College); Professor Green (Sheffield University), Principal Harris (Bangor Normal College); Professor Henderson (Nottingham University College).

For Hon. Sec.:—Mr. H. E. Griffiths.

(4) The following Sub-Committee was appointed to make arrangements for the Annual Meeting on December 20th, 1911:—Miss Julian, Miss Bishop, Miss Lloyd Evans, Mrs. Bannister, Mr. Burrell, Rev. Canon Dennis, Mr. Raymont, and Professor Green, with the Officers.

(5) It was decided on the motion of Rev. Canon Dennis and Rev. Canon Martin to ask the Board of Education to issue the Training College Regulations by the 1st of May each year, and if it be found impossible to issue the whole by that date, to issue the Syllabus alone.

It was also decided on the motion of Miss Allan and Rev. V. W. Pearson to ask the Curriculum Sub-Committee to consider and report upon the Syllabus of the T.C. Regulations 1911.

(6) Some discussion ensued on the Four-Year Course for University Students (Cd. 5762), and it was announced that the Joint Committee of the Training College Association and the Teachers' Training Association was meeting in a day or two to consider the question.

The Rev. Canon Dennis was nominated as a member of this Commitiee in the place of Miss Manley (deceased).

(7) The letter from the Board of Education announcing the proposed formation of a Teachers' Council (Registration) was read.

(8) With regard to the Journal it was decided:—

- (i) That the Association should defray, for 1911 and 1912, the cost of printing the reports of its meetings in the Journal.
- (ii) That the Journal should be published terminally (three times a year).

(9) Communications were read from the Teachers' Guild relating to the proposed "Conference week of Educational Associations," and it was decided to take a vote on the question at the next Annual Meeting.

It was also decided to pay the amount asked (10s.) towards the preliminary expenses.

(10) With regard to the "Training of Teachers' Committee," on which the Association is represented, it was decided to pay the contribution of £2 this year.

In Memoriam.—Lydia Manley.

OUR Association mourns the loss of one of its most honoured members, Miss Lydia Manley, the Principal of Stockwell Training College. She died on the 2nd of July, after an illness which had laid her aside from work for some weeks, but from which we hoped and believed she was making steady recovery.

Miss Manley had been connected with Stockwell College since the year 1884, first as its Head Teacher, and then for 21 years as its Principal. During that time some 2,000 students have passed through her hands, among them students from Siam and from Egypt to whom she gave a mother's care, and whose training under her was a marked success. By her wise and inspiring administration she raised the college to its present very high place in public esteem. Nor was her work confined to the College. The Practising Schools, with their 750 children and 20 mistresses, were under her direct control, and had a very large share of her thought and interest. She was a member of the Board of Education's Consultative Committee from the first, and many other Committees and Governing Bodies, and on all of them she served with the thoroughness which was characteristic of her.

When, last January, the Manchester University presented her with its Honorary M.A. Degree, in recognition of her leadership in the work of training teachers, we felt that the University honoured itself as well as the work she represented by thus enrolling her among its graduates.

The greatness of the loss to her College, which she loved so dearly and served so splendidly, I do not venture to estimate. To all its members I offer my deepest sympathy. They have left to them the inspiration of a great leader and the legacy of a great work. I hope that some one from among them will put on record the story of a life which would have, in many respects, a unique interest in the history of Education.

Our Association will greatly miss Miss Manley's ripe experience, her vigorous common sense, her steadfast upholding of high ideals. There will long be a sense of something wanting at our conferences as we listen in vain for the gentle, deliberate utterances of a judgment singularly balanced and well informed, and widened by most generous sympathies.

It was characteristic of Miss Manley that she enjoyed her work with a freshness of heart which no amount of toil and moil seemed able to deaden. Nay, I had it from her own lips not very long ago—and this must surely be a joy to all those who worked with her—that she found it every year more full of delightful interest. Truly, "Whom the gods love die young."

M. E. BISHOP.

REVIEWS.

"The Psychology of Education." By J. Welton, M.A., Professor of Education in the University of Leeds. (Pp. xxi + 507.) London: Macmillan & Co., 1911. Price 7/6 net.

PROFESSOR WELTON has already laid students of Education under so many obligations—not least by his recent excellent article in the *Encyclopædia Britannica*—that his publication of so large a treatise as the one before us is bound to awaken much interest.

Psychologists during the last dozen years have shown an industry as great and as varied as that of the votaries of any other science. Moreover, many of the eminent investigators have had before their minds at least the possibility of most pedagogical applications of their results, while some have found in such applications the most powerful stimulus to research. As one cuts the leaves of this comely volume one wonders whether the time has come for an ordered inquiry into the value of these applications, and whether Professor Welton has been persuaded to devote to it his great ability for the advantage of us all. The first sentence of the preface, which warns us that the book "is a systematic treatise neither on psychology nor on education" does not destroy our hopes, for the second states that "it endeavours to set forth the relation between these sciences." Nevertheless they are not to be entirely satisfied. Excellent as the book is in many respects, and attractive as it will certainly prove to a large number of readers, the student must not expect to find in it anything like a full discussion of the bearing of modern psychological investigations upon educational processes. The index contains four or five names of "literary" authors to every one of a psychologist of recent date. This circumstance is in harmony with Professor Welton's general treatment of the relations between psychology and education. His real aim is to provide the teacher with leading ideas or categories which will help him to understand and make the best use of his personal experience of the young. If, in a given case, the concrete picture of the literary artist serves this purpose as well as, or better than the abstract formulation of the psychologist, he finds no reason why recourse to the artist should not be preferred.

The question of false expectations raised by the title being set aside, it must be admitted, even in a Journal of Experimental Pedagogy, that there is much to be said for Professor Welton's method. Education, as he justly urges (p. 23), is not, and never will be, merely "applied psychology." He might have added that it is not even applied psychology *plus* applied ethics and logic, any more than landscape painting is applied perspective, chromatics and æsthetics. The problems of the teacher are, like those of the artist, in a certain sense, always unique. General laws may define very important equations of condition, but every problem presents, in addition, its own individual and irreducible element. A book which imports into the scientific consideration of these problems a large measure of the literary temper may, in many cases, be more helpful than one which preserves the spirit of the laboratory throughout.

The reader will be prepared by these observations for the reviewer's opinion that Professor Welton is most successful where his characteristic method has most scope, and least happy where—as in the one short chapter on Bodily Endowment—it is out of place. In this particular chapter, in fact, the author's lack of interest in recent experimental work has made his exposition of the central nervous system inadequate even for a three-page summary. It would have been better to omit it. On the other hand, where he can use psychological arguments as channels for transmitting to the reader the rich stores of his personal experience and reflexion, he is always interesting and informing. No young teacher could fail to profit from contact with a professional personality so broad, so rich, and so wise.

From a book whose merit lies rather in the excellence of its details than in any novelty of its thesis, it is almost unfair to single out points for criticism, favourable or unfavourable. Speaking broadly, Professor Welton takes up topics which one expects to find in a work on the general principles of education, and treats them with characteristic lucidity and good judgment—sometimes, it must be confessed, at almost too generous length. He makes a relatively novel departure from common usage in the distinction he draws (in ch. viii) between attention proper and "absorption," for he would restrict the former term to mental activity guided by clear purpose. His object is the laudable one of combating the pernicious practice of letting "entertainment and amusement take the place of purpose in lessons" (p. 274). From the point of view of psychological science there seem, however, serious objections to the proposed restriction. The conditions of "clearness" (to use Titchener's term) may vary through the course of one and the same conative process, but the clearness is itself a continuous phenomenon. There seems no justification for calling it by a new name simply because the circumstances which accompany it have changed. Moreover, has Professor Welton here really the support of "ordinary thought and speech" (p. 268)? Surely the man in the street who said that a little girl was "absorbed" in a Punch and Judy show would, if pressed, explain that the tragedy was absorbing her *attention*. It is possible, alas, to complain of Professor Welton's use of the term "ideal." Between the "ideal plan" which the inventor has of his machine before he constructs it—or which an ordinary citizen has of a journey from Hampstead to the Crystal Palace before he has made it—and the "ideals" of morality and art, there is an important difference of significance which should not be obscured.

But small disagreements of this kind fortunately do not debar a reviewer from enjoying the pleasure of commending a book to the large body of students who will profit by reading it.

T.P.N.

"**The Place of Psychology in the Training of the Teacher.**" By Alexander Darroch, M.A., Professor of Education in the University of Edinburgh. (Pp. vi + 142.) London: Longmans, Green & Co. 1911. Price 2/- *net*.

THREE of the five lectures gathered into this little volume were addressed to the staff of the Edinburgh Provincial College engaged in the professional training of teacher students, and are now printed, we are informed, at their request. By complying with this request the author admits, presumably, a belief that his addresses will be useful to the general body of persons responsible for forming the next generation of teachers. The belief ought to be erroneous, but is probably well founded. Professor Darroch's main positions—that the young teacher should learn from psychology that the educational process must be based upon the child's instinctive tendencies to activity, and that knowledge in its characteristic modes of genesis is always a means to a desired end—are the common-places of our lecture-rooms and lack nothing in the way of official recognition. But our organization for the training of teachers is growing very rapidly, uses varied instruments, and embraces many types of service. The simple and persuasive exposition of this little book may do much to ensure the "peaceful penetration" of that organization by the principles which should be the intellectual basis of its unity.

At the same time we wish, for the honour of our craft, that Professor Darroch in publishing his lectures had changed or disguised his objective. There are two classes of persons to whom his doctrine might with great advantage have been addressed. These are, on the one hand, the great number of experienced teachers, particularly in secondary schools, who are interested in the theory of their profession, but have received no systematic instruction in it; and, on the other hand the students who, in our numerous training colleges and departments, are entering upon courses of such instruction. The future of training—at any rate in secondary schools—depends a good deal upon the degree to which experienced teachers can be convinced that psychological analysis, following the "biological method" advocated by Professor Darroch, is the indispensable foundation of sound educational practice. Lectures such as the one on "Interest and Effort in Education," given to the secondary school teachers of Aberdeen, and included in this volume, can do much to remove the prejudices which have unfortunately gathered in the schools round the word " psychology." But there is still greater need of a brief and non-technical constructive exposition that shall continue more systematically the good work begun by Professor James's *Talks to Teachers*. Some such exposition is, again, needed by the student in training, who often begins his course with the haziest notions of what psychology is, and of what it can do for him.

To both these classes of readers, and particularly to the second, Professor Darroch's little book should be of real use; for it is clear, interestingly written, and eminently modern. The author is an enthusiastic pragmatist of the "Deweyite" pattern. He has also paid friendly visits to the camp of the Bergsonians, even if he has not, like Professor James, announced his permanent adhesion to the flag of the great French philosopher. But his advocacy of the newer educational principles is sane as well as vigorous, and is thus likely both to commend these principles to the young teacher and to protect him against the temptation to apply them extravagantly.

The captious critic might object to the position "that the student of education must, in the first place, undertake the study of psychology for its own sake, and thereafter, in its relation to educational practice" (p. 12) as contradicting the author's pragmatic principles. The context seems to show, however, that Professor Darroch does not intend to pass all students in training through a course of " academic " psychology before they begin studying the psychology of education. He is only anxious that the student's psychology shall, as far as it goes, be " the psychology of psychologists " and not merely a cultivation of the trick of describing bad teaching methods in an obscure jargon. With this view everyone must be in agreement.

T. P. NUNN.

" Experimental Pedagogy and the Psychology of the Child." By Dr. Ed. Claparède, Professor of Experimental Psychology, Geneva University. Translated from the Fourth Edition by Mary Louch and Henry Holman. Edward Arnold. 5/- net.

THERE is much in this book to stimulate thought and discussion among experts, but it is mainly a wide survey of the field, calculated to satisfy the need of those who wish to be brought rapidly and pleasantly into touch with the main lines of work now in progress and with some of their results. There is little of the technical and statistical; the author gives his opinions in lucid paragraphs, and the charming style of the writing has been skilfully preserved in this translation. An excellent little bibliography and historical sketch opens the book, and covers twenty countries and the period from 1787 to Binet's " Idées Modernes," with some additions by the translators. England in 1909 was evidently far from the front rank. Other useful lists of books and papers are given at the end of each chapter.

Chapters II and III are logical efforts to clear the ground, and may well be left for a second reading. Our science has hardly reached the stage when a formal grammar of it, with a brave Greek nomenclature, is quite necessary.

For the ordinary reader, the second half of the book is the specially valuable part. In the chapter on Mental Development, a bulky mass of information and advice is made manageable by grouping it round a few central conceptions; these are the activities, play and imitation, and the stimuli, interest and desire. Education must build on these; traditional methods suffer rough treatment at the author's hands. He refers of necessity to the " biogenetic law," but handles it with the cautiousness of a philosopher who can distinguish between a species and a social community. From the " culture-epochs " idea he selects the fact that play is an atavistic echo of former human activities, and infers that child-life is, and should be, play until adolescence: he has a natural, biological right to it, like his right to shelter and fire. (Is it true, as a footnote suggests, that children will play accurately at savage camp-life without any external suggestion ?) The author quotes the argument (superfluous to many of us) that similar atavistic echoes make religious teaching at adolescence a natural right, the omission of which leaves a gap in a boy's development. This kind of argument would make tattooing as necessary as vaccination. When we glance back along the supposed line of our development, it is the gaps, obliterations and short cuts in the individual scheme. as compared with the racial, on which we congratulate ourselves. The play-theory is well worked out, and in dealing with "interest" the author gives a fine example of logical analysis.

The tendency to give the reader a refreshing piece of synthesis instead of the usual brief and isolated summaries and statistics shows itself again in the last chapter. A large number of experiments usually treated as tests of the efficiency of various mental and physical powers are here grouped as means of measuring fatigue. The word "fatigue" like "interest" is made to yield all its meanings. A theory, deserving further discussion, is introduced of a deep central reservoir of energy and shallow locally-produced stores, to account for ennui, over-pressure, spurts, and the power to continue severe work under a pleasant stimulus. The theory is obviously only schematic at present, but the hasty reader might infer from the text some established physiological basis. Attempts are made to find what studies and tests are most fatiguing ; what time of the day, week or year is best for work ; what positions of the body aid mental effort ; and a tantalizing reference is made to Weichardt's fatigue anti-toxin. The author's striking comments in this and the preceding chapters will lead many teachers to reconsider their time-tables.

R. DELANEY.

"Motive Force and Motivation-Tracks. A Research in Will-Psychology."

By H. Boyd Barrett, S.J., (xiv. + 225 p.p.), Longmans & Co. 6/- net (unbound).

THIS is an admirable example of modern psychological method, and illustrates very clearly the advances which have been made since the days when experimental inquiry was limited to various types of sensory perception. No mental function has refused to submit to experimental treatment of greater or less exactness but the analysis and classification of volitional phenomena have been attacked less frequently than might have been supposed.

After a short critical account of modern theories of the Will, Mr. Barrett explains the object and method of his research. He is dominantly concerned with the investigation of motives and motivation, with such problems as that of how motives are strengthened and whether they can be measured. Since, as he points out, the problem of character formation is reducible to that of motivation, the enquiry is of the utmost pedagogic importance.

His method was briefly as follows:—Eight colourless liquids, each with characteristic taste and maintained at constant strength, were given "Nonsense" names, the tastes were then learned by his three subjects, associations with tastes and names being formed. This was the first stage—taste and names of each substance were repeated three times every morning and every evening until they were perfectly learned, but before this degree of perfection was attained (i e., after a week's repetitions) a series of recognition experiments was begun, which were timed with a chronoscope. One of the nonsense names was shown, the subject reacted when he "recognized" it and afterwards gave a careful introspective account of the experience. When the recognition times grew regular, each subject wrote down the eight substances in the order of their hedonic value for him ; interesting discrepancies were, of course, revealed. Thus a definite scale of values for each subject was obtained. The third stage consisted in presenting the various possible pairs of liquids (28 in all) each indicated by its name, with the instruction to the subject to take up and taste the one he prepared. This was so skilfully arranged that the intervals of time between the appearance of the names, and the reaction thereto, the picking up of the glass were accurately measured. introspective analysis followed.

The value of the work rests very largely upon the introspective data furnished by the subjects, in virtue of which the author found it possible to draw up a tentative character scheme on the basis of which he ventures upon a formula as representing the volitional and intellectual value of one of his subjects. The author admits the boldness of such an attempt, and avowedly "runs the risk of being accounted rash." We give the formula, though interested people must go to the book for the account of the method by which it is reached.

$$S^2 = \text{Act. } 1.5 + \text{Res. } 1 + \text{Hed. } 3 + \text{Hes. } 2 + \text{Incon. } 2.5 + \text{Æsth. } 1 + \text{Repr. } 0.5 \quad . \; . \; . \; . \; . \; . \; . \; . \; .$$

where Act. = Active Tendencies, Res. = Resistance to Tendencies, Hed. = Hedonism, Hes. = Hesitation, Incon. = Inconsistency, Repr. = Representations, Images, &c., Æsth. = Æstheticism.

Whatever we may think of such "rashness," it is at any rate interesting; the whole essay is a model alike in method and in clearness. The concluding chapter on psychology of character is particularly important to teachers and those who are engaged in their training. They will, of course, ask whether the phenomena of choice as they were brought out by the experiments are applicable to life. There in the laboratory the direction was clear—take and drink—the possibility of declining was shut out by experimental conditions. A clearly-known scale of values helps enormously when faced by alternatives, one of which *must* be taken, but is not the secret of character formation contained in that *must*, rather than in the scale of values? It is the person who has not the energy to choose anything who is the despair of the social worker. The point is not altogether overlooked by Father Barrett, but it is not hesitation simply that we have in mind.

J. A. GREEN.

"Report of a Conference on the Teaching of Arithmetic in London Elementary Schools."—Dec., 1906—Dec., 1908. No. 1,430. 132 pp. P. S. King & Son, 1911 (for the London County Council). 1/- net.

This report is well worth the attention of all who are interested in the teaching of arithmetic in Primary Schools. It is the work of a Conference representative of all grades of education in London, numbering among its members some well-known advocates of reform in the teaching of mathematics. Whatever criticism may be directed against particular sections of the Report, it is, without doubt, the most important document of its kind that has yet appeared, though its value is perhaps less than it would have been three years ago when the report was drawn up. Delay in publication was apparently due to the desire of the Conference "to ascertain the views of persons representing different Schools of thought with regard to psychological aspects of the question, as presented in the Report." But we are not told what those views were, and it is the psychological side of the Report that is, we think, most open to criticism.

The Report is divided into five chapters. The first gives a brief survey of the history of elementary mathematical teaching and discusses the principles underlying the sound teaching of the subject, together with questions of organization. The second chapter deals with the teaching of arithmetic in Infants' Schools. The next two are devoted to the teaching of elementary mathematics in the Senior Departments of Primary Schools, while the last contains a summary of replies to a questionnaire widely circulated amongst educational institutions in London.

The chief points of the Report can be summed up in a few words. It seeks to apply to the teaching of arithmetic in Primary Schools the spirit of that reform in mathematical teaching which has been revolutionizing the subject in higher institutions during the last decade. Teaching which does not start from "practical" everyday problems, which does not correspond to a need in the minds of children and does not stimulate curiosity, is of little value. Only when these conditions are fulfilled does the teaching become "concrete." Without concreteness advance in mathematical knowledge and power apart from the mechanical manipulation of symbols is impossible. But two pitfalls await the teacher, the dangers of which might have been emphasized more strongly, and some indication of the means of avoiding them might have been given. Thus the presence of apparatus and material of all sorts does not make teaching concrete, nor do problems become practical when solution demands the use of measuring instruments

The Report rightly lays stress on the impropriety of making initial instruction in any branch of knowledge too analytic. The theory that led us to teach writing by way of pothooks, and reading by way of alphabet and syllable, is responsible for the belief that arithmetic rather than elementary mathematics is the right subject for the Primary School. But arithmetic, apart from elementary mathematics, is a very artifictal thing which tends to become mere practice in the manipulation of figures. The position is clear enough, and the Report attempts to indicate the lines this new development should take. It gives in detail the arithmetic syllabus of the Demonstration Schools of the London Day Training College as an example of one of many possible ways of vitalizing the subject by a more generous interpretation of what "school arithmetic" should be. The materials are drawn from sources which later on are the fields of geometry, algebra, trigonometry, mechanics and physics. Full use is made of such problems as arise in geography, nature study and domestic economy, as a means of opening up new sources of mathematical interest. Similarly, handwork and measurement are called on in the belief that the presence of an interesting practical problem is a *motive* for mathematical enterprise.

Such a scheme carries with it certain dangers. It may lead, for example, to the neglect of the computative side of arithmetic for the practical work of measurement and construction, and the problem that is to be the starting point for acquiring a new mathematical method may be such as to detract attention from the main purpose, namely, the mathematics. An example of this latter danger is seen in the treatment of inverse proportion. Thus, to quote from the syllabus: "Simple and striking instances of *inverse proportion* arise from the study of the conditions of accuracy of the common scales, of the steel-yard, forms of weighing machine seen in every railway station and in Elementary Schools during the medical inspection. Here also the pupil is taught to associate the relation with its graphic symbol—the rectangular hyperbola—and to use the symbol as a ready means of acquiring and retaining mastery over the idea it represents." But surely, simpler and more "concrete" examples of inverse proportion are nearer to hand. A boy knows that if he wants to buy fireworks and has only a limited sum of money to spend, the number he gets will be inversely as the amount he pays for each. It requires no apparatus of any sort for him to work this out. Indeed, whilst the syllabus is in every way suggestive and stimulating, it gives the impression of calling too much upon apparatus, and seems to draw its illustrations unduly from the fields of physical science. Perhaps this is unavoidable in trying to get a well-rounded scheme. The syllabus also illustrates another point made in the Report. No matter how admirably a scheme may suit a particular class of boys, it is not capable of general application. Each school must draw up its own.

Among the recommendations is one which urges the importance of introducing into the ordinary teaching some account of the history of mathematics. We do not dispute the value of such procedure for older children, but, parodoxical as it may seem, we are interested in the history of a subject only when we possess knowledge enough to appreciate its significance. The historical method of teaching overlooks this. There is a vast difference between the mental attitude of a child and that of a man who at any period of our history has contributed to human knowledge.

Attention is called in the Preface to the psychological aspect of the problems that are met with in the teaching of arithmetic, and it is suggested that teachers should be provided with a book giving due space to a discussion of the philosophical principles underlying mathematical methods and symbolism. This is much to be desired, but if such a book is to be read, it must be conspicuously clear and simple in expression. In the Report itself, psychological terms are loosely used, and some of the fundamental difficulties in the teaching of arithmetic are discussed in a perplexing way. For example, what meaning will be attached to such a statement as "the sub-conscious nature of the operations of human mind, characteristic in some degree in all, and very predominantly so of younger pupils, is a fact of profound significance to teachers and deserves constant recognition and application." Again, it is not very helpful to be told that "the abstract idea of a particular number (say five) . . . is at least a product of the creative activity of the mind working . . in its idealizing and imaginative aspects," and if this is not very clear, what shall be said of the discussion on the evolution of the number idea leading up to this? It is a simple matter to show that we get our first notions of number through perception. Once the names of numbers have been learnt we are in a position to deal with groups of things, dividing them and putting them together; thus we gradually come to think of them in terms of number. But it is not very easy to understand what is meant by "abstract number" and "concrete symbolism." Again, we find such statements as "the strengthening (of) the reasoning faculties by teaching the elements of algebra and geometry in conjunction with arithmetic is still exceptional (in girls' schools)"; "the requisition of the power to handle problems successfully . . . is dependent initially on the ability of the teacher to produce a clear perception of the steps of reasoning and mental analysis to be applied to the problems in hand." The Report seems to talk of "problems" as though they were things apart. It is only at the end that the real difficulty is hinted at, and even then it is allowed to pass with the comment that in the replies from boys' schools the importance of English repeatedly received such emphasis "that intelligent training in arithmetic and in English must be regarded as materially beneficial."

It is unfortunate that this valuable Report should suffer in its presentation of the theoretical bases of the subject. It is however satisfactory to feel that this defect does not seriously diminish its practical value and importance.

C. BIRCHENOUGH.

"Department of Education—Papers." Series 1 to 4 (1907-1910). Armstrong College, Newcastle-upon-Tyne. 1s. net each.

The *Papers* are the outcome of a desire expressed by the past students of the Armstrong College at the Christmas reunion, 1906, for a Society engaged in active educational work.

In an introductory note (Series I) attention is called to the little advance that has been made in knowledge of educational methods during the past forty years, and it is suggested that good work could be done if members would "combine to describe methods that they have proved to be successful." To this end contributions "dealing with actual experiences in teaching and in organisation" are invited.

The contributions fall roughly into two classes, viz., descriptions by the staff of new departures in the training of primary students at the Armstrong College, and short papers on special method, education abroad, &c., by past students and others. To the outsider perhaps the most impressive feature of the *Papers* is the encouragement they offer to effort. So far the contributions as a whole can hardly be said to follow the lead of the introductory note. In reading them it is necessary to remember that the majority are written by students or ex-students with no very wide knowledge of education. Consequently they do not always reach the standard that might reasonably be looked for in an Educational Journal. The contributors have yet to feel their feet, and there is a good deal of loose writing. Reading is *not* "to a large extent a question of separating and combining different symbols" (I 23), nor does Nature Study aim "at developing accurate *observation* by a study of natural objects" (I 35); neither is "Literature to be taught for the purpose of developing the reasoning powers" (III 6); and we certainly do not want "young boys to make decent models in clay or plasticine of the deltas of the Nile and Mississippi from their atlases" (III 16). Mistakes of this sort concern the very foundation of special method in their respective spheres. Many of the contributions would be better if they were less ambitious in scope. The writers commonly attempt broad surveys that are quite beyond their reach. They talk too much in general terms. Moreover, there is a mistaken ideal of striving after logical completeness. The school syllabus in Geography (IV 28) is a fair example of this. Not only so, but it tries repeatedly to deduce the impossible. These and other errors are the fault of youth.

The idea of encouraging old students of the College to put their practical experiences on record, or in some other way to continue their professional studies, is an admirable one. Young writers should, however, learn the importance of acknowledging their sources. The article, *The Schools of Dickens* (III) is particularly open to criticism on these grounds. Not only are both content and method of treatment determined by J. L. Hughes' *Dickens as an Educator*, but the first two or three pages of the article are composed of verbatim extracts from this book without any acknowledgement whatever. In the same way the writer of the article on *The Teaching of Geography* (III) carries no conviction, because the only examples he gives in showing how to treat the globe are taken verbatim from Elderton's *Maps and Map Drawing*, also without acknowledgement.

The most interesting parts of the *Papers* are the descriptive accounts of new departures in the training of teachers at the Armstrong College. The articles on the Two Training Camps (II & IV) are well worth reading. The camps were held for a fortnight at the end of the Summer Term of 1908 and 1910, and were composed of the men students of the College, some 30 in number, and about 120 boys between 12 and 16 years of age, drawn from a variety of schools. The object of the camp was to bring students into more vital contact with boys than the ordinary school practice was found to do. Thus we are told that the relations of the students to their classes while being serious and honest, nevertheless had "a tendency to be formal, artificial, and school mastery." Camp life, it was thought, would encourage a more natural attitude towards boys, and would bring home to the students "the errors of too severe formalism."

The difficulties confronting the editor of a journal of this nature can only be guessed at—how to give of the best and yet not discourage honest effort. In spite of obvious defects these *Papers* represent an interesting venture that deserves every success.

C. Birchenough.

"A Primer of Teaching Practice." By J. A. Green, M.A., Professor of Education in the University of Sheffield; and C. Birchenough, M.A., Lecturer in Education in the University of Sheffield. Longmans, Green & Co. 2/6 net.

Readers of this journal who undertake the more strictly professional preparation of the students in our training colleges must, we imagine, have frequently felt, regarding the newer literature of pedagogy, that though it includes good material for the student in his second or third year, there is little in it that can properly be placed in his hands as soon as he enters college. What we need is something which, whilst avoiding all rule-of-thumb procedure, shall make directly for the acquirement of practical skill; something written in simple and untechnical language, but so written that there will be nothing to unlearn when the more theoretical study of education is embarked upon.

To those who have felt such a need we strongly recommend a perusal of this book. The authors have singled out the various elements in which good teaching consists (narration, description, experiment, questioning, illustration, &c.), they have explained clearly and simply the conditions under which skill in these directions may be acquired, and they have appended to each chapter a series of exercises. The contents of the book are further enriched by two coloured plates and sixteen figures in the text—all very good and helpful.

The exercises to which we have referred are a most significant and valuable, as we believe they are a novel, feature of the book, and it is to them that we direct special attention. The problem-method, which has traditionally been employed only in mathematical studies, has in recent times been applied successfully to other subjects, including geography and even history. But why not to pedagogy itself? Is there any good reason why in conducting classes in pedagogy we should so often break our own rules about evoking self-activity and the like? The writers of this book think not, and we cordially agree with them. They have provided a series of problems which the more thoughtful students will enjoy, and which will, we think, goad the least thoughtful into something approaching reflection upon the ways and means of making their lessons interesting and fruitful. We are tempted to quote some of the problems, but we will content ourselves by saying to those engaged in the professional training of teachers—whatever other books you possess, get this one. T. RAYMONT.

"How to Study." By F. M. McMurray (viii + 324 pp.). Harrap. 5/-.

THIS book is a severe indictment of the teacher. She will think (all teachers are "she's" in it) it undeserved reproof to be told of the two, the child and the teacher, the child knows best how to study. Indeed we took up the book expecting it to be a treatise helpful for the teacher: we find it is intended for the child. The German tells us that study is beyond the child: we do not agree, but we act as if we did, and very few are the teachers who dare to let children "study." Children will copy anything or anybody; but, left alone, they are as helpless as the rank and file of an army. This is the condemnation of the teacher, and the child is not allowed to reply: "See us in our holidays; see us in our games; watch us at home and in the nursery. You will come to the conclusion that we can study; everywhere but at school." There is nothing very startling in this book, except, perhaps, its pathetic appeal to the teacher *to reform her methods altogether.* "We don't talk at school," said a critical child; "the teacher does the talking." The book was badly needed here, and though it is intensely American in phrase and metaphor, it is as interesting as the rest of the author's work. The investigations which apparently set the book going were made by a lady, Dr. Lida B. Earhart. But, we may ask, have we left our teachers or our scholars any *time* to study, or to think? A. BURRELL.

"An Anthology of Modern English Prose (1741-4-1892)." By A. Barnett and L. Dale. Longmans (pp. 1—452). 4/6.

THE editors rightly say that verse anthologies are more common than prose; and, curiously, old English prose has been better served than the more modern. The present collection of short pieces is, as we understand it, literary, though a good teacher or student might find a good deal in it which is interesting from the linguistic point of view. No one can cavil at choice of extracts: they are part of the editors' selves; but a purpose would have been served if other fine extracts had been referred to by chapter and verse. Minto's well-known book contained, of course, much more, and was made in the interests of style and rhetoric; and it might be well used along with this. Beckford and Emily Brontë are omitted, but many writers not usually given a place are represented, e.g., Jowett, Tyndall, and Bagehot. A volume of earlier prose is promised: let us hope we shall have it in unbowdlerized spelling: the old founts are too much to ask for. A. BURRELL.

"The Teaching of Drawing." By S. Polale, H. C. Quilter and W. B. Clive. University Tutorial Press Ltd. Price 2/6.

THE book contains a critical survey of the various materials available for pictorial representation, a statement of some methods that may be adopted in teaching to ensure certain results, and a more detailed account of the various branches of drawing that are represented in a scheme of work suitable for schools.

The book should prove of great value to teachers, inasmuch as the directions supplied are definite and practical and in entire agreement with recent theory of Art teaching. Each form of drawing, such as "brushwork and colour-study," "drawing of objects in perspective," is traced through various stages of increasing difficulty, and thus the work for the different classes of a school is outlined. The treatment of these various subjects comprises numerous interesting suggestions and ingenious devices for ensuring certain results, which clearly indicate mastery not only of the subject but of practical methods of teaching.

Excellent though the treatment of each topic is, one is conscious in reading the book of the absence of some clear conception of the meaning and purpose of the work as a whole. There is no indication, for example, in what way the work of young children should differ from that of older pupils, beyond the fact that it must be easier. Again, all reasons why one form of drawing should be adopted rather than another are withheld or quite insufficiently indicated, so that many of the directions are of somewhat dogmatic character. The book lacks a foundation educational theory which would give force to the statements which are fully worthy of being carried out. C. VON WYSS.

"English Sounds: A Book for English Boys and Girls." By Walter Rippmann Dent's Modern Language Series (pp. i-iv, 1-60). 1/- net.

THIS excellent little book is an attempt to interest those " who have not yet begun the first foreign language " in a phonetic analysis of their own speech. Presumably, therefore, it is for children under eleven years of age, and the homely reference to " Mother and Father and Nurse " (with all the alluring identification of capitals) as our earliest teachers confirms this interpretation. If those who are thus artfully tempted out to sea can weather the storm when they get to " initially, medially and finally," they will have a prosperous and useful voyage. Not only will they have learned to observe the sounds of speech in a way that will greatly help them in the study of a foreign language later, but also the correct speaking of their own tongue will be cultivated.

The phonetic script taught is simple and adequate, quite within the compass of the boys and girls in the upper standards of elementary schools. There will be nothing to unlearn later for those who begin with this book. In the constant appeal to thought rather than memory the book is a model of what such a book should be.

The standard of pronunciation seems to northern ears somewhat too southern. It would be difficult, for instance, to persuade a northerner that "for" and "four" should be sounded alike. V. W. PEARSON.

"Elements of Mechanics." By George W. Parker, M.A. Longmans, Green & Co. (245 pp.).

THE subject is treated in a very simple manner, requiring only a slight acquaintance with geometry and algebra, and little more than the definitions and first principles of trigonometry. Considering this handicap, a wonderful amount and variety of practice are given to the student. There is a tendency in books on mechanics to reduce to a very small amount the mathematics required, but the wisdom of such a course may be doubted. The equilibrium of forces in one plane is explained both graphically and analytically, with the usual applications to the simple machines. The study of statics before that of kinetics is recommended in the preface, and many teachers who have experimented with the opposite arrangement are coming to agree with the author. In Part II, uniform acceleration, simple harmonic motion, and a short neat proof of the acceleration to the centre of a circle are given. Two proofs are given of the equation, $s=ut+\frac{1}{2}ft^2$, in paragraphs 168 and 170. The latter uses the graphic method and is complete. The former seems to assume that what has been defined as " average " velocity occurs at time $\frac{1}{2}t$. Now this is not obvious, and those students that find no difficulty are frequently the least intelligent in a class. Most beginners assent as readily to the proposition, that the " average " velocity obviously occurs at the middle point of the space passed over. The reason that par. 170 appears harder is that it tackles the difficulty which par. 168 ignores. It would be an improvement if par. 168 were simply omitted as a proof. Another difficulty that troubles many of the best students at the beginning of their study of kinetics is inadequately explained, namely, the proposition that mass is proportional to weight. A proof of this is promised in paragraph 10, but when the proof is reached, another paragraph is quoted that appears to assume the point under consideration.

The printing of the book is excellent, and the diagrams clearly drawn. Numerous examples are given, most of which are numerical, as they ought to be, and useful indications of those to be omitted on a first reading are supplied.

T. HUGH MILLER.

"A Study of Words." By E. M. Blackburn, M.A. Longmans, Green & Co.

THE writer has selected and arranged alphabetically words that have interested him. It is the work of an amateur, suggestive rather than authoritative. The alphabetic arrangement compels comparison with such a book as the Concise Oxford Dictionary, and Mr. Blackburn suffers by the comparison. The book will, however, provide profitable occupation for leisure hours. It is a pity that the compiler has not made it clear that Modern German equivalents are not the parents of English words. His arrangement lays him open to this suggestion: the word *dale*, for instance, appears as "Ger. *thal*, a low place between hills."

A. W. REED.

BOOKS RECEIVED AND MINOR NOTICES.

"L'Année Psychologique 1911," publiée par A. Binet (Masson et Cie).

The seventeenth volume contains a number of articles of pedagogical interest. M. Binet's further work on Intelligence levels is referred to elsewhere. M. Lapie discusses the relation of the school to society in a manner different from Prof. Dewey. How far is the school responsible for social instability? His confessedly limited statistics are interesting. Taking a number of school records he makes a comparison between the occupations of parents and the occupations to which their children with school advantages have settled, and how far school successes have affected instability of this kind. Thus, out of 188 who gained leaving certificates, 68% followed their fathers' footsteps, and out of 413 who had not been so successful, 70%—an insignificant difference. The excellent critical accounts of psychological research for the year make the *Année* a particularly useful volume.

"The Classic Myths in English Literature and in Art." By C. M. Gayley, Litt.D. (xxvii+597 pp.). Ginn & Co. Revised Edition.

To the teacher of English whose acquaintance with the classics of Greece and Rome is limited, this volume is bound to prove most useful. As a book of reference it should at least find a place in every Secondary School and Training College library. The illustrations are numerous and helpful.

"The Adolescent." By J. W. Slaughter, with an Introduction by J. J. Findlay (xv+100 pp.). Swan Sonenschein; 2/6.

This little book should be read by all who have to deal with youths and maidens in their teens, if time will not allow them to wade through the interesting but ponderous volumes of Dr. Stanley Hall. The chapters on education lay down such disputable problems as " that no school can claim from the one below it any more preparation than is provided by meeting the requirements of that stage of growth"; the classics belong to the University specialist, and should be left to him; &c. But Dr. Slaughter is always most interesting when he provokes contradiction.

"The Training of Elementary School Teachers in Germany." By J. L. Kandel, M.A., Ph.D. (vii+137 pp.). Teachers' College, Columbia University; 1 doll. 50c.

One of the Columbia University contributions to education, a very useful volume in an unequal series. Perhaps the most interesting chapter in the book is that which deals with the Training of Teachers who are in actual eervice. The German teacher remains a student of his profession after he has obtained his certificate, an attitude of mind which makes such journals as *Deutsche Schule*, *Der Saemann* and *Zeitschrift für Pädagogische Psychologie* possible, not to mention the *Institut für experimentelle Pädagogik und Psychologie* in Leipzig, founded by the Teachers' Association of that city.

"**Stories to tell Children.**" By Sara C. Bryant. (251 pp.). G. G. Harrop & Co.; 2/6 net.

An attractive collection introduced by an appeal for the recognition of the story as an aid in the oral teaching of English. The author's previous work on this subject is well known, and her second volume is likely to prove as popular and useful as the first.

"**Emile on Education.**" By J. J. Rousseau, translated by B. Foxley, M.A. (x+444 pp.) Everyman's Library. Dent & Co.; 1/- net.

An admirable and much-needed translation of this important book. Miss Foxley has done her work well.

"**When should a Child begin School?**" by W. H. Winch, M.A.; 98 pp.; Warwick & York, Baltimore, U.S.A.

It is significant of much that this admirable investigation into the problem of the five-year lower limit of school attendance should have been published in America. The research was carried out in London, and concerns an English problem, but apparently no English publisher would find it worth while to take it. By careful use of statistical data, the author shows that children who enter school before the fifth year do not gain in the long run. Their position in the school in relation to their age does not, that is to say, justify the earlier start. There is, of course, a social problem attached to this question of school babies, which is not discussed in the book.

"**Questions and Exercises in Geography.**" I. The World. By Robert J. Finch (xv+48 pp. Ralph Holland & Co.; 6d. net.

"**The Use of the Bible in the Education of the Young,**" by T. Raymont, M.A.; (x + 254 pp.); Longmans, Green & Co.

"**La Revue Psychologique.**" "**Archives Sociologiques.**"

"**The Woman Teacher.**" "**The Woman Teacher's Magazine.**"

"**Child Life.**" "**School Review.**"

NOTES.

The Journal will in future be published three times a year, viz., the 5th of March, the 5th of June, and the 5th of December. In addition to original papers which we hope to publish in each issue, special attention will be given to all types of educational research work which may appear elsewhere. It is hoped the Journal may become a recognized medium for the interchange of views between those engaged in pedagogical research and the working schoolmaster.

From the English point of view, the Brussels Conference on Child Study (*Pédologie*) was not a complete success. Unfortunately, the local authorities made such tardy use of the English Committee's suggestions that they were of practically no service, and English workers in this field were only slightly represented. An international conference is not easy to organize, and no doubt the next one will profit greatly by the experience of this.

The attendance at the Education Section of the British Association was not perhaps so good as it has been in previous years though the contributed papers were uniformly good. Public attention was caught by the discussion on Examinations, opened by Mr. Hartog and contributed to by Sir William Ramsay, Dr. T. P. Nunn, and others. The influence of that type of examination, not unknown to English Training Colleges, in which the percentage of failures is something less than one, was not considered. Mr. Hartog has published his views in a paper contributed to the Society of Arts, and obtainable in pamphlet form.

The Committee appointed to report on Mental and Physical Factors involved in Education presented an account of the present procedure in the selection of mentally defective children by Medical Officers, showing that there is a good deal of confusion of thought and of practice in this important matter. The Committee also brought forward evidence which indicated the necessity of reform in our present methods of training these children. Eight hours manual work, sixteen hours at the three R's, is the customary arrangement, and after six or seven years of this, scarcely any pupils reach Standard II level in all three directions.

A valuable interim report on the question of overlapping between School and University courses was presented by Professor R. A. Gregory.

What an excellent meeting ground for teachers in all grades of schools the British Association would make, if it were used as it might be! Except, perhaps, the annual conference of the Teachers' Guild, there is no meeting-ground quite so catholic in its interests, and the recognition of scientific methods in educational research by the organizing Committee should make it doubly attractive to schoolmasters interested in educational progress.

Professor Meumann, who has just accepted a call to Hamburg, is to be congratulated on the appearance of the first volume of the second edition of his epoch-making *Vorlesungen zur Einführung in die Experimentelle Pädagogik*. The new edition is much enlarged and is in three volumes. The first volume deals exclusively with the physical and mental development of children. Professor Van Biervliet has also entered into the same field with a volume entitled *Premiers Elements de Pédagogie Expérimentelle* (Alcan, Paris). Both these books will be noticed in our March issue.

How many of our readers make use of the Board of Education Library in Whitehall? What is probably the best pedagogical library in the country is not, we think, nearly as widely known as it ought to be. It is open to the public without formality. The books are carefully classified and easily accessible. It would add to its usefulness if catalogues of accessions were put on sale as government publications usually are.

SHEFFIELD: J. W. NORTHEND, PRINTER, NORFOLK ROW.

Vol. 1, No. 3. *March, 1912.*

WHAT LONDON CHILDREN LIKE TO DRAW.

BY P. B. BALLARD, M.A.

To the question: what will a boy of a given age draw if he is allowed to draw what he likes? there can be no definite answer. It is only possible to state certain probabilities. But even this presumptive knowledge is of value to the teacher. For it is well that he should know what it is that his class in the main wishes to do, except perhaps when he believes that much virtue accrues from frustrating that wish. The idea of gaining this kind of knowledge by examining a large number of spontaneous drawings is by no means new. But London is unique and demands a special inquiry.

Towards the close of 1911 I collected nearly twenty thousand memory drawings made by children in some of the elementary schools of South London. The same mode of procedure was adopted in each school. In order to counteract the undue influence of recent drawing lessons, a catalogue of various possible objects was cited to the class, and the pupils were asked to draw from memory anything they liked, bearing in mind that the objects actually mentioned were suggestive merely. The papers were sent to my home, and were there classified according to the ages of the children and the kinds of object drawn. The results are shown in percentage in Tables I and II.

Table I.—Boys.

Age.	Human Beings.	Animals	Birds and Insects.	Fishes.	Plant Life.	Vehicles.	Ships.	Houses.	Weapons and Instruments.	Objects (miscell.)	Land-scapes.	Total No. of Dr'wings
3, 4	23·6+	6·6	3·3	·5+	6·6	10·6+	9·9	11·4+	8·8+	18·5+	0	394
5	14·0	4·3	3·7+	1·1	12·7	16·2	18·6	15·2	3·7+	10·3	·3+	915
6	13·3	3·6	3·7+	1·2+	12·2	21·7	20·0	12·1	3·4+	8·5	·3+	993
7	8·8+	3·7	2·7+	2·0+	14·4	15·2+	27·6	13·0	1·7+	9·1+	1·6+	1175
8	7·9	4·9+	5·1+	1·6+	14·8	8·3+	27·1+	14·2+	1·7+	12·9	1·4	1095
9	6·9+	3·0	3·5	3·2+	15·9	8·2+	26·3+	12·3+	3·2	16·0	1·5	1071
10	9·9	3·9+	3·1+	2·8+	14·8	6·8	24·2	12·0+	4·2	17·0	1·4	1096
11	10·6+	4·7	4·1	2·0+	12·9+	6·2+	18·4+	11·5	6·1+	20·3	3·1+	1027
12	12·8+	5·0+	4·8+	2·9	13·3	6·3+	13·0	12·2+	3·6+	22·3	3·7+	934
13-15	10·9	5·8	3·2+	2·2	14·8+	6·2+	10·0+	10·8	4·9+	27·5	3·8	1059
Totals	1069	429	364	203	1340	1026	1992	1223	371	1564	178	9759
% of Totals	11·0	4·4	3·7+	2·1	13·7+	10·5+	20·4+	12·5+	3·8+	16·0+	1·8+	

Table II.—Girls.

Age.	Human Beings.	Animals	Birds and Insects.	Fishes.	Plant Life.	Vehicles.	Ships.	Houses.	Weapons and Instruments.	Objects (miscell.)	Landscapes.	Total No. of Dr'wings
3, 4	26·3	9·6+	1·9+	1·0	13·5	1·6+	5·1+	12·8+	4·5	23·7+	0	312
5	22·2+	3·8+	3·6+	·9	22·5	4·4	9·9	15·6	2·6+	14·3+	·2+	913
6	20·0	3·7+	3·7+	·9+	26·7+	5·2+	10·2	18·3	1·4+	10·6	·1+	991
7	11·7	2·4+	3·9+	1·4+	37·1+	2·4+	10·2	20·4	·7	9·2	·7	1198
8	6·9+	2·5	5·0	1·8	36·6	·5+	9·2+	23·5+	1·7	11·6	1·0	1140
9	6·3+	3·0	6·1+	2·4	40·6	1·0	6·9+	17·6+	1·0	14·2+	·9	1139
10	7·5+	1·9+	5·8+	2·6+	40·5+	1·0	6·0+	15·7+	1·8+	16·2+	·9+	999
11	7·6	2·8+	5·8+	2·3	39·8	1·3+	4·0+	15·5	1·1+	18·6	1·1	963
12	10·2	2·5	6·5	1·9	37·5	1·2+	4·7	12·2	1·2+	21·5+	·7	896
13-15	8·0	3·5	5·5	2·0	39·4	1·4	3·1	8·0	1·0	25·8	2·4	1001
Totals	1084	296	477	169	3353	191	685	1571	138	1506	82	9552
% of Totals	11·3+	3·1	5·0	1·8	35·1+	2·0	7·2	16·4+	1·4+	15·8	·9	

We should be under no misconception as to what these numbers really mean. They do not necessarily indicate what objects children are most interested in, but rather what objects they are most interested in drawing. A girl's interest in dolls, for instance, which Dr. Stanley Hall has shown to be at its maximum when she is eight and a half years old, is not directly revealed in her drawings, although there is some trace of its influence. Due allowances having been made for competing motives, the results tell us much about the things that the young mind loves to dwell upon.

In the diagrams that follow, the continuous lines represent the curves for boys and the broken lines the curves for girls.

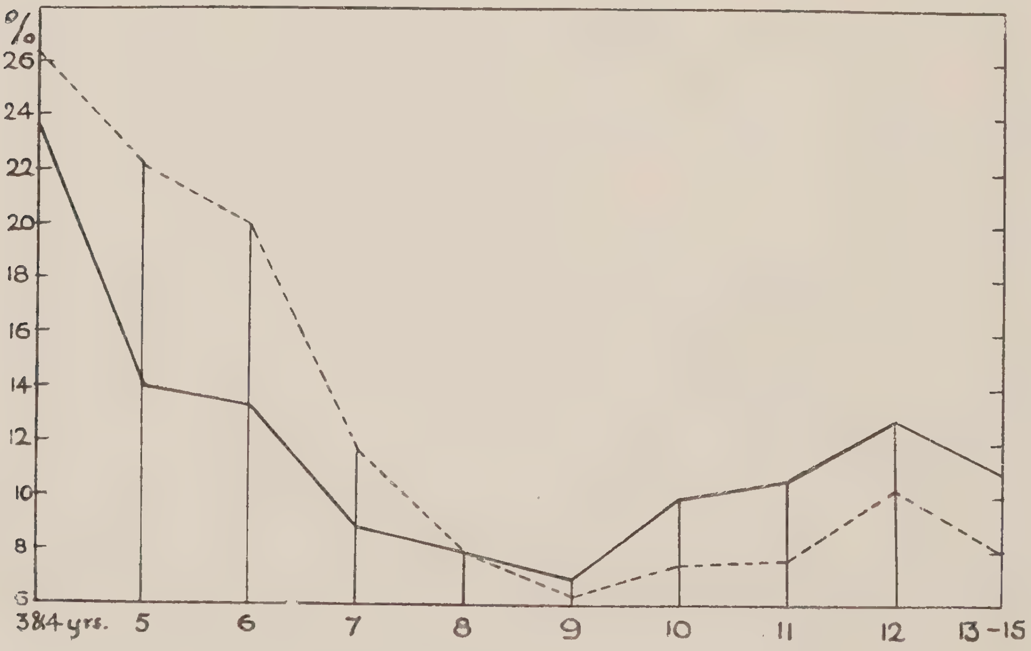

Fig. 1. Human Beings.

Human Beings.

Figure 1 indicates the curve of frequency with which human beings were chosen at the various ages. The age of nine marks a critical period, and the difference between the two halves of the curve does not adequately represent the difference between the drawings before nine and the drawings after. For with the child before that age the human interest manifestly pervades and seasons all others. If he draws a house, and labels it a house, it is not a mere thing of brick and mortar. Faces peer out of the windows, a man stands smoking on the doorstep, people pass to and fro in front. Indeed he is rarely content with this: he wants to impress upon us the fact that the house is inhabited. So he makes the front wall transparent, and we see all the beds occupied by sleepers, while the family dines downstairs. They apparently arrange matters after the manner of Box and Cox. When he draws tramcars and omnibuses there is no dearth of passengers. And his ships are nobly manned. Indeed the skipper is often big enough to sink the ship. So, although these latter drawings are classified as houses, vehicles, and ships, many of them might almost as appropriately have been classified as human beings. After the age of nine, however, there is a tendency to shirk the human element. When a boy of eight sketches a taxi-cab, as he is fond of doing, he will probably forget some essential parts of its equipment; but he will never forget the driver and the passenger. At the age of eleven he will often represent the mechnical details with marvellous faithfulness, but neither driver nor passenger is there.

Other differences appear. Before nine, full faces predominate; after nine, profiles. Before nine, garments are decorative, or merely symbolic of sex. A row of buttons distinguishes the man, and a hat with feathers the woman. Skirts, when they are drawn, are often diaphanous. After nine, sartorial truthfulness begins to be observed, and the fashions are not overlooked. The universal sign of manhood seems to be a pipe, and of womanhood a little dog at the end of a string.

It is interesting to note that Earl Barnes fixes an age somewhere between nine and ten as the transition point between diagrammatic drawing and pictorial drawing; and Kerschensteiner seems to regard ten as the dividing age. It is fairly certain, therefore, that some some time about nine or ten years of age imaginative drawing tends to pass over to observational drawing. Before that period the child prefers drawing from past observation; after that period he takes more kindly to present observation.

Why should the frequency of drawings of human beings be least just about the time when the conflicting influences of symbolism and realism are equally matched? And why should the frequency increase as realism gains the ascendancy? And why should these happen in the case of the human figure and not in the case of other objects? To answer the last question first, I think the secret lies in the fact that the human figure is unique in its interest and in its difficulty of representation. It attracts by its interest and repels by its difficulty. The child of five is influenced by the former and ignores the latter. But with the gradual rise of the critical attitude he begins to suspect the adequacy of his representation. His outlook becomes more realistic. He gets dissatisfied with the old kind of drawing, and has not acquired sufficient skill for the new. Moreover, the drawing of the figure is the point at which his art is most exposed to ridicule; and to ridicule the child is extremely sensitive. He finds that while the drawing of an impossible ship never raises a laugh, the drawing of an impossible man nearly always does. It is merely an instance of the general law that the human reference, direct or indirect, is never absent from the comic. At about nine years of age the child's skill in representing appearances is generally very low, but with increasing years comes increasing skill, and with increasing skill comes increasing confidence. Courage mounts with success.

The change in the direction of the curve after twelve years is not easy to explain. Does it betoken a second prolonged descent? This does not seem to be probable; for if the approach of adolescence occasioned the change it would appear earlier in the girls' curve than in the boys'. The most plausible explanation seems to be that several children, after twelve years of age, receive special instruction in art, and their interest in still life is reinforced. This view is confirmed by the fact that, coincident with the fall in the curves for human beings, we find a rise in the curves for plant life and such miscellaneous objects as serve for models in the art room.

A significant difference appears in the curves for the two sexes. Girls seem to resist the claim of realism more steadily than boys; the struggle between the two opposing influences referred to above is more prolonged, and the issue less certain. From a careful examination of the drawings I am inclined to think that the turning point with girls is not nine but ten years of age, or even later.

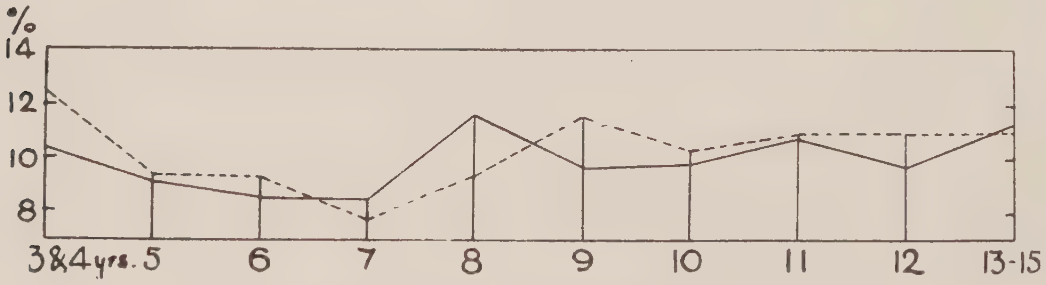

Fig. 2. Animals.

Animals.

The number of animals drawn (in the narrower sense of the term) was unexpectedly small. The horse was the only animal that figured largely. A few asses appeared (I refer to the drawings) and an occasional cat, dog, or elephant. Sheep and oxen were almost entirely absent. The animals grazing in the fields were horses—at least, they looked more like horses than anything else.

As the separate curves for birds and insects and for fishes present no marked features of interest, I have combined in one graph the results for all animal life.

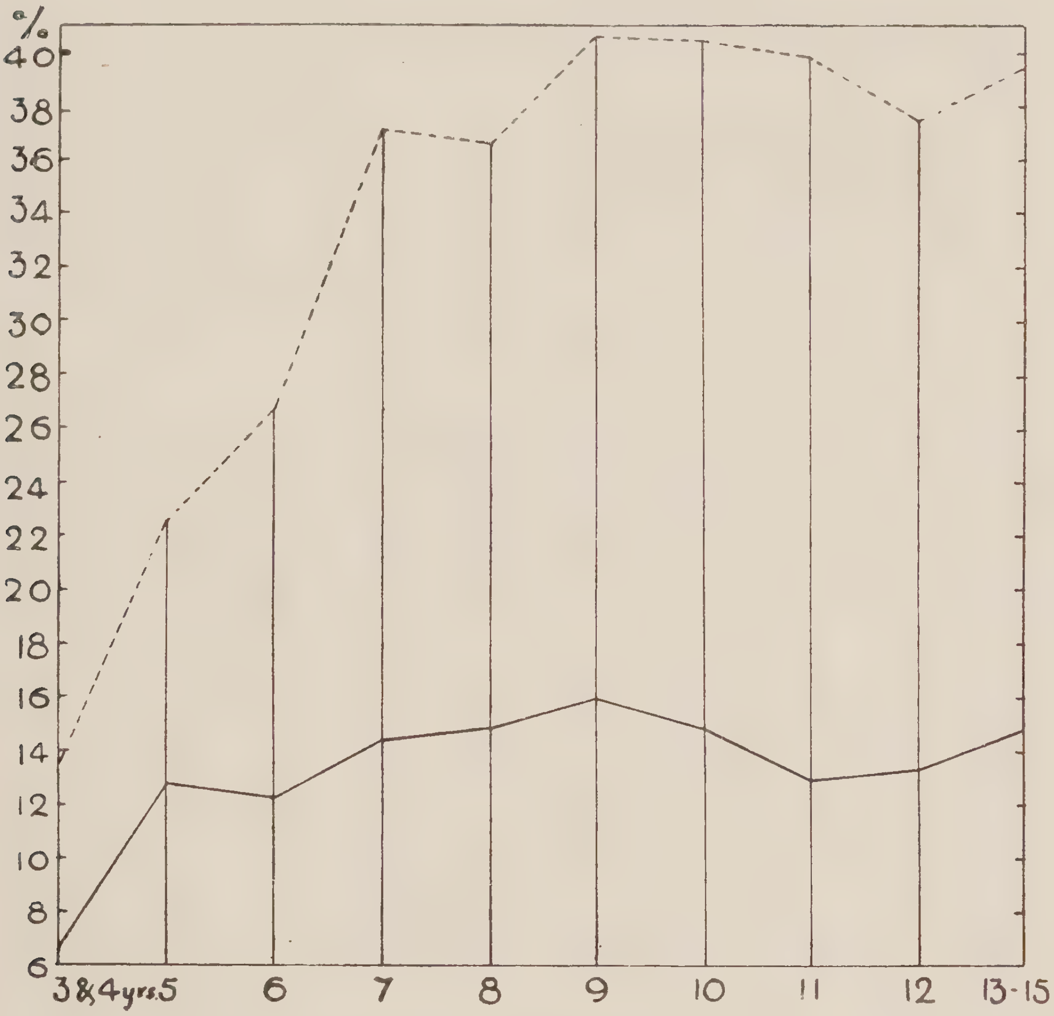

Fig. 3. Plant Life.

Plant Life.

Here we find the influence of the Nature Study movement. This chart would probably have been of an entirely different character if the investigation had been made fifteen years ago. Its most arresting feature is the difference between the curve for boys and the curve for girls. Girls seem to take nearly three times as much interest in plant life as boys This is not due to differences in the curricula, for up to eight years of age the sexes are always taught together, and the greatest divergence appears before that age. Moreover, many of the drawings came from mixed senior schools.

Except for the first year, some form of plant life, generally a flower, is pre-eminently the London girl's favourite object.

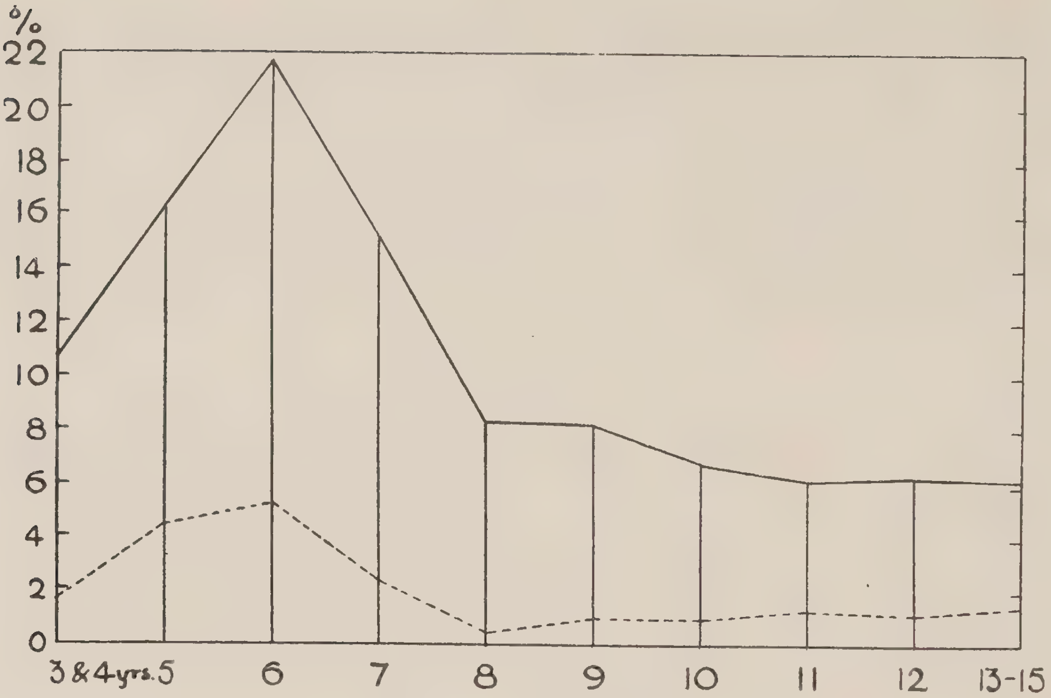

Fig. 4. Vehicles.

Vehicles.

The term vehicles is used to denote all means of locomotion except ships. Trams, cars, omnibuses, balloons and aeroplanes are included. Boys take much more interest in locomotion than girls; and both show a maximum interest at six years of age. After eight there is but little change.

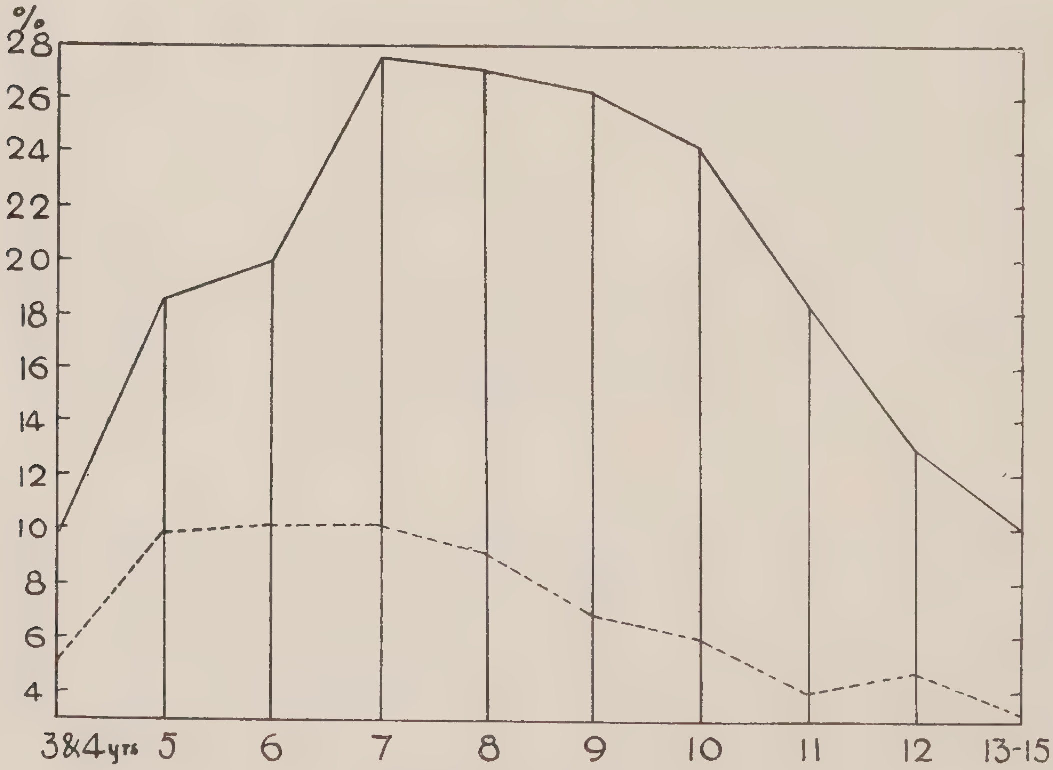

Fig. 5. Ships.

Ships.

The amount of interest taken by London children in ships is astonishing. It is nearly twice as great among boys as among girls, but even among the latter it is not inconsiderable. It is surely a remarkable fact that between the ages of five and twelve, that is during nearly the whole of his school life, the favourite object for the London boy is a ship. Between seven and ten one drawing out of every four is a ship. The fact is the more remarkable when we remember that ships form no part of his ordinary environment. All the boys concerned in the inquiry lived some distance from the Thames, and in many instances they had never seen the river. Nor did the drawing of ships receive any encouragement during the formal drawing lesson in school; for the drawing models exclusively consist of botanical specimens and small objects. Nor can the frequency of this type of drawing be accounted for by saying that a ship is easy to draw; for this consideration has no weight with the younger children, while the ships drawn by the older boys are by no means mere schematic diagrams: they represent craft of various types with rigging and equipment in many instances wonderfully elaborate and, so far as I could judge, wonderfully correct. It points to an inextinguishable love of the sea, common, possibly, to all boys, certainly to all British boys.

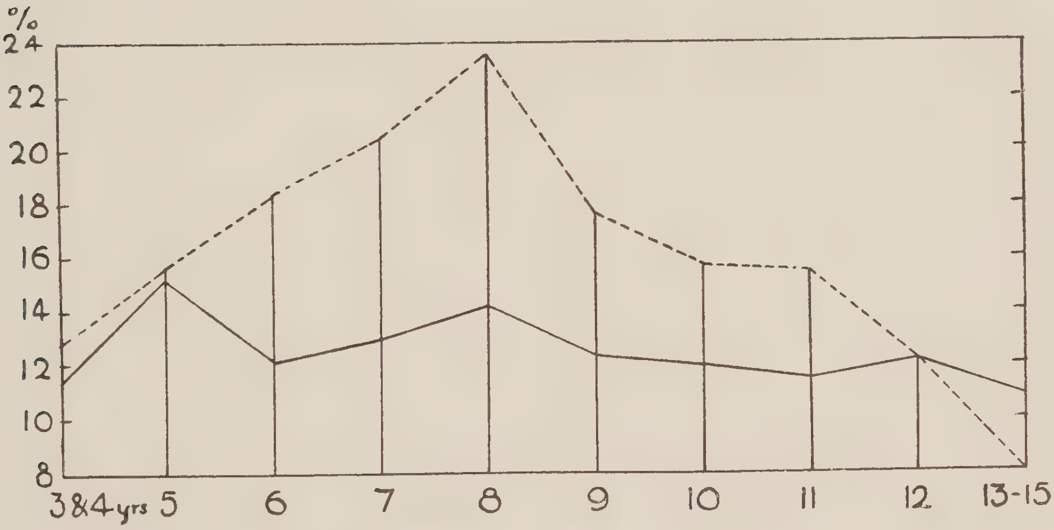

Fig. 6. Houses.

Houses.

The curves for houses present peculiar features. The boys' curve fluctuates within narrow limits, but the girls' curve shows a rapid rise to a culminating point, and then a still more rapid fall. The girls show a greater interest in houses than boys, but after twelve they draw them less frequently. This is, I think, because the perspective baffles them. Indeed, the perspective is bad all through, but the older boys succeed better than the girls in getting beyond the Chinese stage. Very young children are fond of drawing houses, and even when they have made a large drawing of something else they will often draw a little house in the corner, just to show that they can draw one. Indeed, this tendency to crowd into the picture the whole of their drawing repertory renders classification rather difficult. Girls display a greater fondness for showing the inside of the house, which is often fashioned on the model of the doll's house. In fact, the age of maximum interest in dolls and the age of maximum interest in drawing houses nearly coincide.

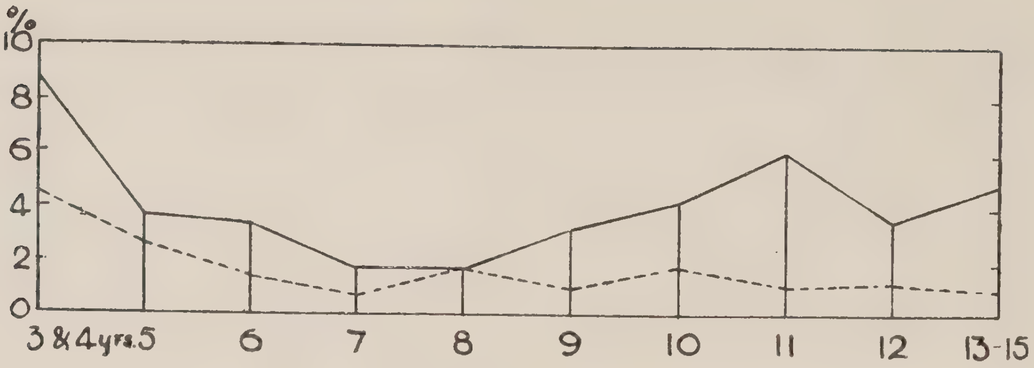

Fig. 7. Weapons and Instruments.

Weapons and Instruments.

It was thought desirable to have a special category for implements of sport and warfare. Boys, as might be expected, show a greater liking for these things than girls. The high point at four means toys, and at eleven weapons of destruction.

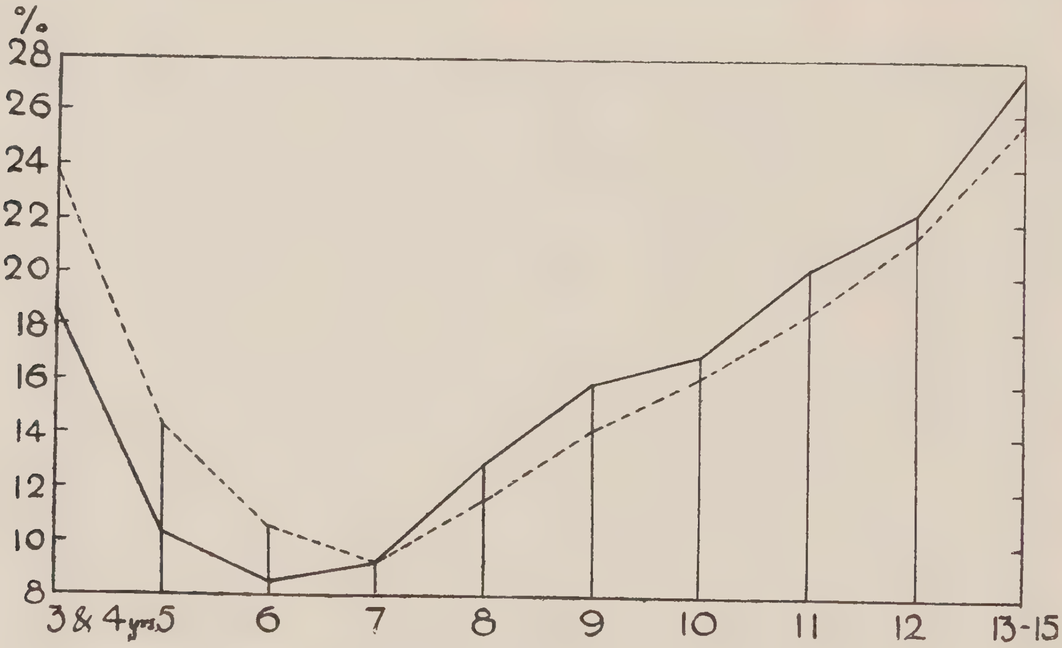

Fig. 8. Miscellaneous Objects.

Miscellaneous Objects.

It is in the drawing of such small objects as may conveniently serve as models in the classroom that the influence of the school upon the children's choice is most apparent. The "babies" are encouraged to draw simple objects such as balls and boxes. We accordingly find the curve high at the beginning; but it descends rapidly as the children realize the possibilities of drawing as a means of expressing their ideas of the big and stirring things of life. When the child reaches the senior school the steady pressure of classroom observation is shown in the regular ascent of the line.

There is no evidence here to support the charge sometimes made against girls that they are more hide-bound than boys by the conventionalities of the school; although such evidence is not wanting in the curve for plant life.

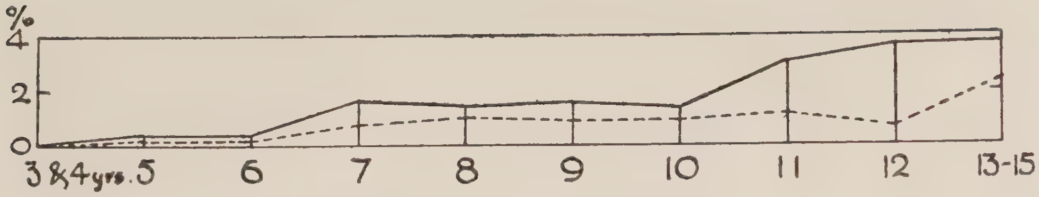

Fig. 9. Landscapes.

Landscapes.

No drawings were included in this group which did not contain at least three of the four elements: fore-ground, middle distance, distance, and sky. Many of the infants' drawings classified under other heads contained skies, and the sun was always shining.

Order of Preference.

It will be seen from Tables I and II that the general order of preference with boys is: Ships, miscellaneous objects, plant life, houses, human beings, vehicles, animals, weapons, and landscapes; while the general order for girls is: Plant life, houses, miscellaneous objects, human beings, animals, ships, vehicles, weapons, and landscapes.

Stanley Hall states that the order for children below ten years of age is: The human figure, animals, plants or houses, mechanical inventions, geometrical designs, and ornaments.* This is very far from being true of the London boy. Geometrical designs were almost entirely absent. Among the twenty thousand drawings there were only one or two instances of those balanced designs which we associate with South Kensington. It is possible that different orders discovered by other investigators are partly due to differences in mode of classification. If, for instance, I counted every human being, or every house, or every plant drawn, the order of frequency would appear somewhat different. But each picture, however crowded, counted for but one object—the object which seemed to be of central interest.

The relative frequency with which the various objects were chosen at different ages may be readily seen by glancing at the accompanying figures. The letters at the bottom represent the various groups of objects. H—Human Beings. A—Animals. P—Plant Life. V—Vehicles. S—Ships. Hs—Houses. W—Weapons. M—Miscellaneous Objects. L—Landscapes.

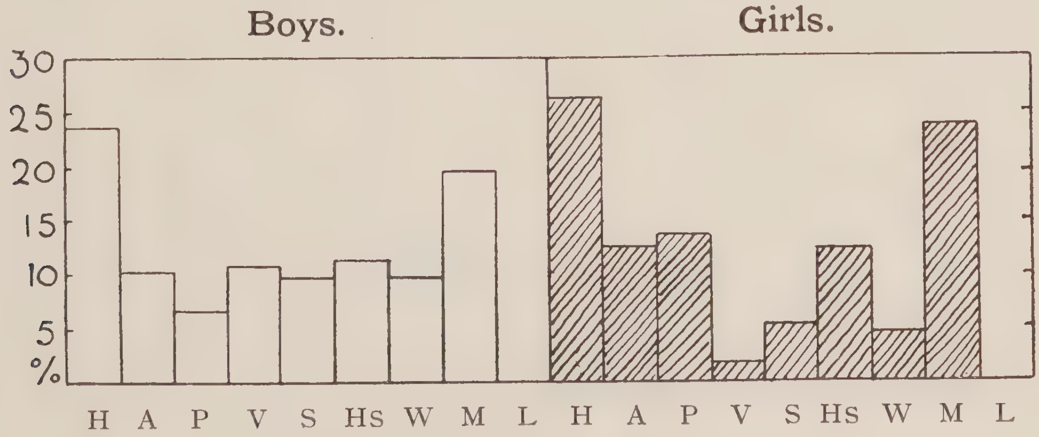

Fig. 10. (Ages 3 and 4.)

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*Educational Problems, Vol. II p. 515

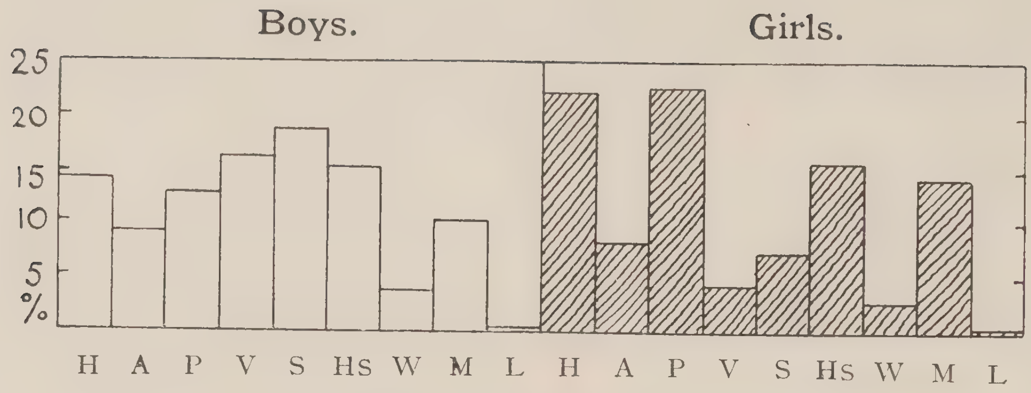

Fig. 11. (Age 5.)

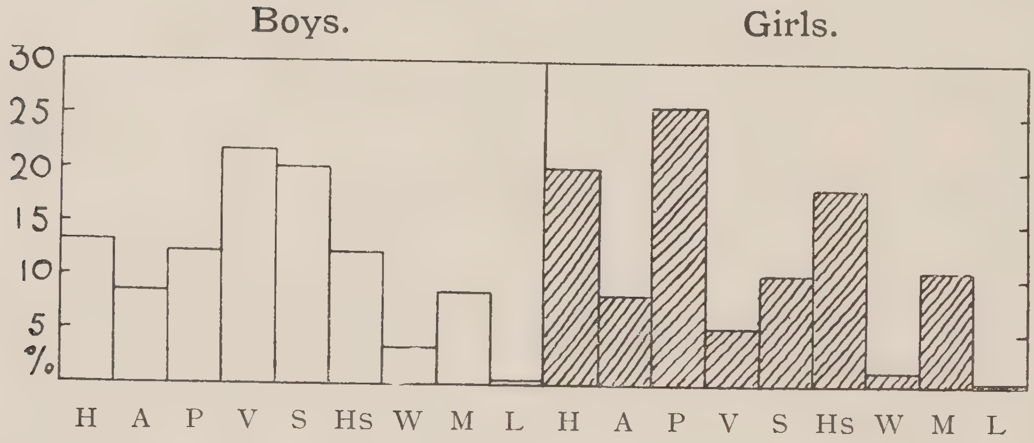

Fig. 12. (Age 6.)

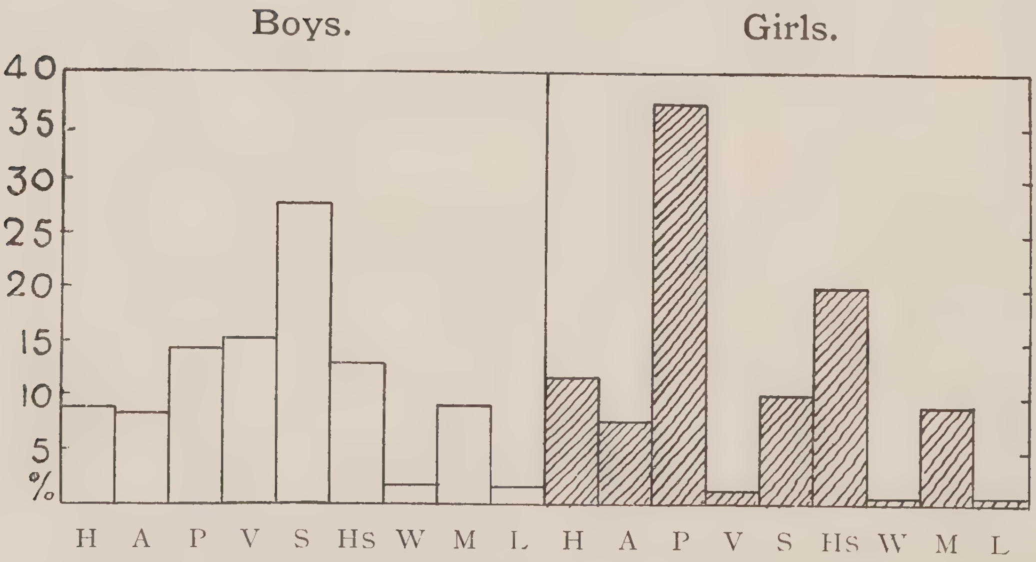

Fig. 13. (Age 7.)

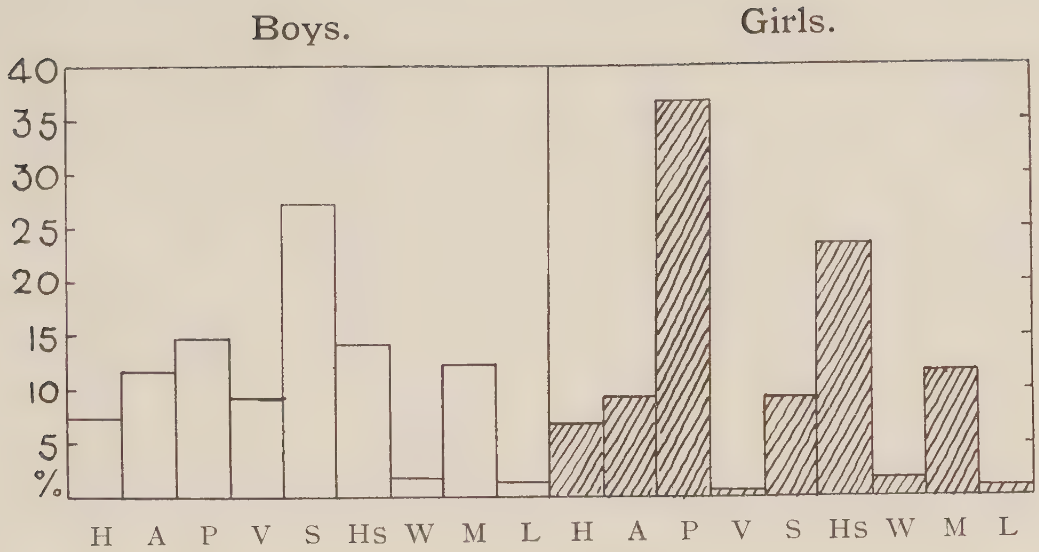

Fig. 14. (Age 8.)

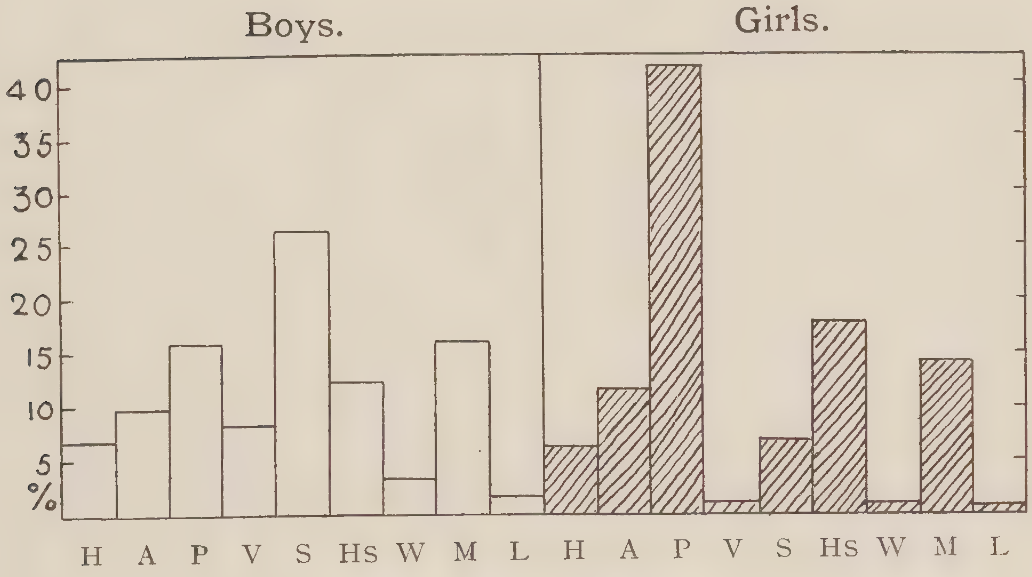

Fig. 15. (Age 9.)

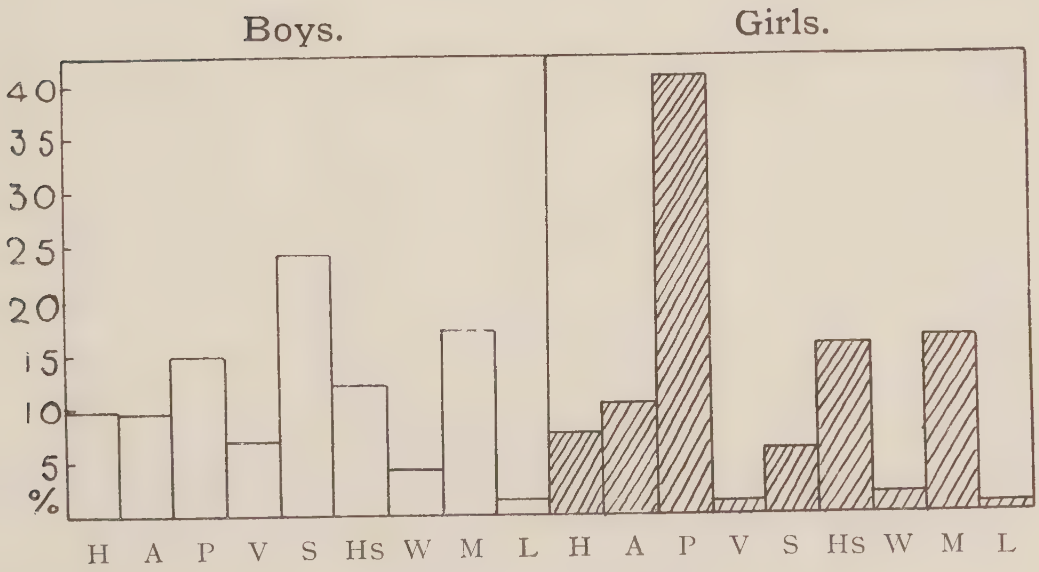

Fig- 16. (Age 10.)

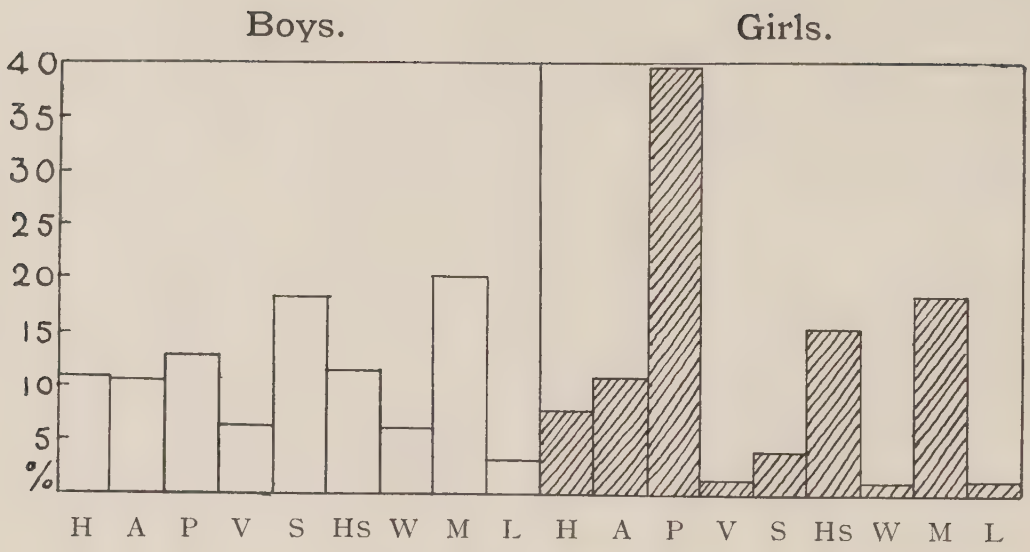

Fig. 17. (Age 11.)

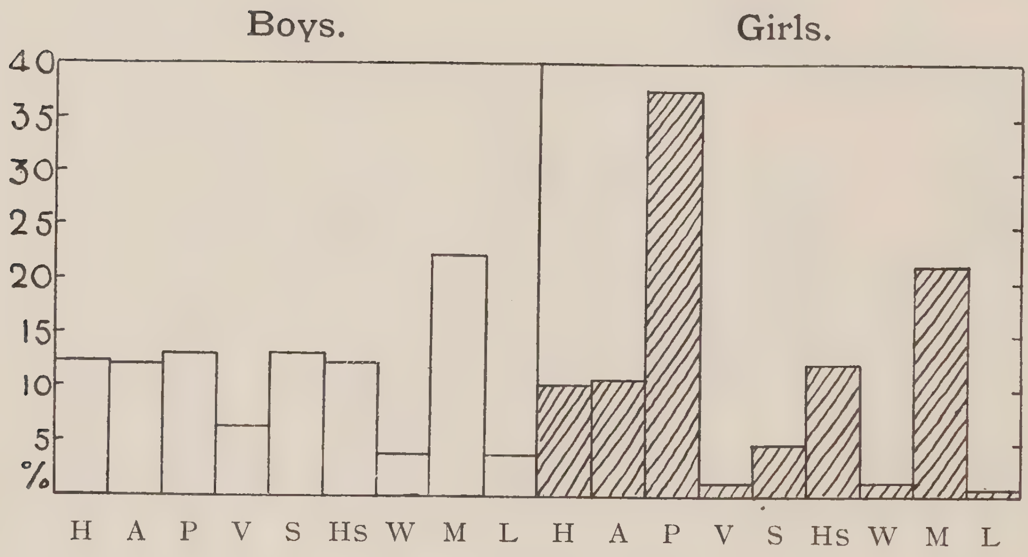

Fig. 18. (Age 12.)

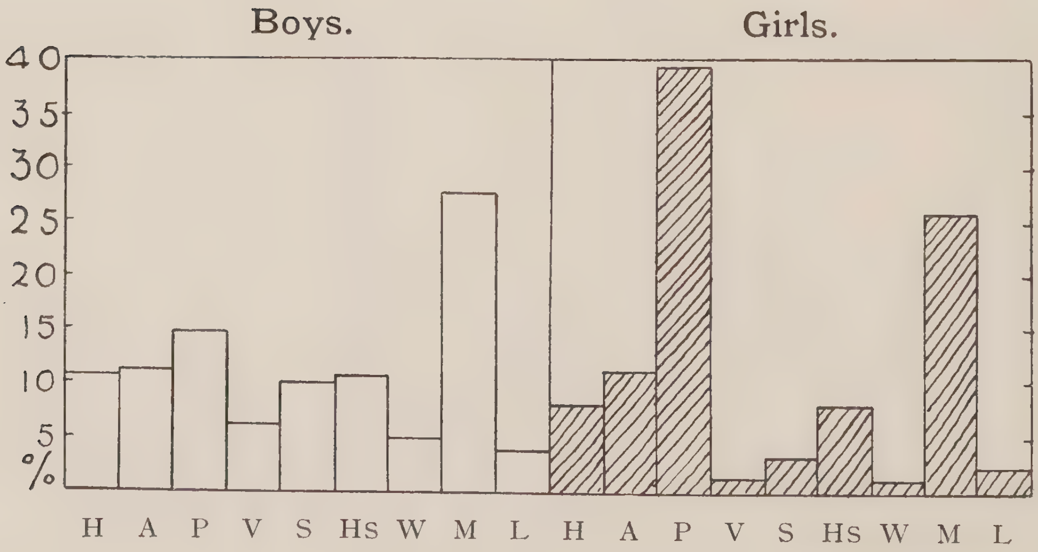

Fig. 19. (Age 13.)

Pedagogical Inferences.

Every psychologist or teacher who carefully studies these figures will probably draw inferences of his own. The drawings of the earlier years tell us more frankly what the child likes to draw; those of the later years reveal what he dares to draw—dares in the teeth of criticism and ridicule. This is shown most clearly in the case of the human figure. We cannot suppose that the chart represents the variations in the child's interest in mankind. The descent of the curve is due to factors which should, I think, be neutralized. Virtually nothing is done in the senior schools to develop the interest in drawing men and women which is so manifest in the infant school—a neglect which springs, I think, from that unwholesome fear of complex reality which in the olden days used to restrict the exercises to a barren series of lines and curves. The same is true of movement. The people in infants' pictures are badly drawn, but they are evidently doing something. An impossible cart is drawn by an impossible horse, but it is patent to anybody that the thing moves. That movement is difficult to represent is no reason why children should not attempt it, and be encouraged to look out for its signs. The seed has started germinating in the infant school. It should not die for want of watering.

Advantage should be taken of the boys' love of ships. Good models of boats, yachts, and steamboats would be a welcome change from pots and kettles.

Whether the laws of perspective should be taught directly or not is a moot queston; but there is little doubt that the pupil should be required to put some amount of perspective into his drawings. And the best starting point is probably the house, and not the usual geometrical models. Models of houses are easy to secure or to make, and it is in drawing these, which he loves, that the pupil will be most likely to pick up perspective, which he does not love—at least his enthusiasm for it is not very apparent. Models are only suggested as substitutes for the real thing, when the real thing is inaccessible. Drawing in the open air is delightful; and it is nearly always possible to sketch a house from the playground.

THE FUNCTION OF THE TRAINING COLLEGE.

Presidential Address to the Training College Association.

By Professor J. ADAMS, LL.D.

Amid the whir of the machinery of the various sections of our Association that are doing such laborious and useful service to the cause of training, we must not forget the wider outlook. It is well that we should begin this general meeting with a review of some of the broader aspects of our work, so that we may be able to give a reasonable answer to any intelligent enquirer who, hearing of our meeting, asks the plain question: What is it all about? Assuming that the plain man knows in a general way what a training college is, he may legitimately ask for a clear statement of its function. As matters stand, this is in most cases threefold.

(1). It has to complete the general education of its students: it has to make sure that they themselves know the subjects they are afterwards to teach to others. This function is generally recognized by the public and highly approved. No one questions the desirability of communicating knowledge; though there are those who maintain that the work of the training college should begin on the understanding that the students have already mastered the subjects they propose to teach.

(2). But knowledge has not only to be acquired by the students; it has to be communicated by them to others. Accordingly the colleges must give instruction in the various methods of teaching. Further, since the professional teacher is by virtue of his office, and whether he admits it or no, an educator, it is necessary to include also instruction in the theory of education. It is in connection with this theoretical work that the colleges are regarded with some suspicion by many of the teachers in actual practice. They are apt to regard all this theory as so much aerial cobweb-making, at which anyone is entitled to take a hand. One man's theory is as good as another's. They do not realize the magnitude of the body of facts that have passed out of the controversial area, and are now universally recognized. Educational theory has become consolidated to such an extent that in the training colleges it would be possible to spend the whole of the available time of the students in doing nothing else but communicating the body of sound doctrine that is of general acceptation. The newest educational literature illustrates this consolidation of theory in the present marked tendency to deal with education as a whole, and not as mere methodology relieved by scraps of psychology and logic applied to educational problems. There are no fewer than five recent books with the same title—*Principles of Education.* As was right and proper, one of our own members led the way. Mr. T. Raymont was first in the field. Then came W. C. Ruediger at the beginning of 1910, followed later in the same year by E. N. Henderson; while in 1911 W. Franklin Jones gave us his small but effective book, and F. E. Bolton brought up the rear with a volume of 790 large pages. These works do not treat of various parts of philosophy, ethics and logic, "as applied to" education, but of education itself. Even when one aspect, as the psychological, is brought into greater prominence, as in the case of Professor Welton's recent work, the subject is not psychology in its educational applications, but education in a psychological setting. Time was when Thomas Love Peacock could write with impunity the words, "The bore of all bores . . . His subject had no beginning, middle nor end. It was Education."* That time is past. Education may remain a bore, but it is no longer amorphous. It has attained to a beginning, middle and end. It is organized. Professor W. C. Bagley makes this clear by his treatment of the subject in his *Educative Process.*

Accordingly the second function of the training college can be fulfilled only when this great body of recognized educational truth is properly presented to the students. The master of method most addicted to theory and the practical teacher most contemptuous of theory have between them such an enormous common store of principles on which they are agreed, that it is difficult to cover the whole of the orthodox doctrine in the time at the disposal of the colleges, to say nothing of adding matters on which there may be differences of opinion. When the practical teacher's suspicion of the training college is analysed it is found to consist in a profound distrust of the more controversial parts of educational theory.

This needs some explanation. If the suspicion is justified, it is clear that the colleges do not confine themselves to the body of recognized doctrine. Rightly or wrongly they practically claim to lead in educational theory. As a university professor is expected not only to teach his subject but to make advances in it, so the training colleges may be fairly expected not merely to present in the best way the body of knowledge already acquired, but to add to that knowledge. There are those who reject this view, and ask why it should be supposed that the staff of a training college know more about education than the practical teachers who spend their whole time in doing what the others only talk about. In fact the claim is sometimes made that the training college people should go to the practical teacher and learn of him. Within limits the suggestion is a good one, and as a matter of fact is acted upon by the training college people, who, after all, have the advantage of the practical teacher, since they understand his position, while too frequently he does not understand theirs. In the relation between educational theory and practice a new situation has been created by the establishment of University Departments of Education, headed by professors. The tendency to theory is more marked among professors than even among the training college people. The master of method, in fact, holds an intermediate place between the teacher in the school class-room and the professor in the university class-room. The master of method, indeed, holds the place of Münsterberg's intermediary between the pure theorist and the pure executant, or Comte's

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[*] Quoted by Mr. P. A. Barnett as motto for his *Teaching and Organization.*

intermediary between the *savant* and the operative. No doubt the professor is no longer able, single-handed, to deal with the whole field of education. One man can no more profess Education as a whole than he can profess Chemistry as a whole. The present position marks a movement towards an organization in which university, training college, and ordinary school will be linked up into one whole with no divided interests; the university supplying the theory and the newer developments, the school supplying the field of practical criticism, and the training college holding the balance between the two—saving the schools from becoming mere institutions of rule of thumb, and at the same time keeping the theorists within the realm of the practical.

(3). For the third function of the training colleges is to supply a sufficient amount of practice to enable their students to begin their life work with the minimum amount of discomfort to themselves and disorganization of the schools to which they are appointed. There is no doubt a great temptation for the training colleges to over-emphasize theory. As Stanley Hall in his recent book says, "The teacher loves form, the pupil content." In the case of the master of method "content" is actual teaching, and the love of form is as seductive here as elsewhere. Yet the training colleges have always upheld the importance of the practical. For this there is an historical reason. They were in their origin nothing more than practising schools, where young people—and many who were no longer young—went to see teaching done by masters of the craft, and to try on occasion their own prentice hands. The natural and legitimate love of form led to the development of an elaborate theoretical side, but the colleges have never lost their sense of the importance of actual practice. This is proved by their attitude towards the preliminary training of candidates for admission. Wherever offered a choice, the colleges have been solid in preferring those candidates who have had experience in actual teaching, even when this experience has involved a certain sacrifice in academic attainments. What is wanted, however, is genuine school experience, not mere school practice. The old pupil-teacher system supplied a set of candidates who came to the colleges already trained. The main work of the college was to eradicate certain faults that were almost inevitable in the case of young people who had been thrust into responsible positions before their time. Excessive practice in school merely confirmed the first teaching habits, whatever these were—good or bad. Sometimes the head teacher or the class teacher did real training work, and the pupil teachers who came from schools where this was the case were quite admirable, for the best possible kind of training is always that given on the spot by a master in the art. If we had a sufficient number of such masters who not only could but would train young teachers, there would be no need for training colleges so far as the mere acquisition of skill is concerned. But no profession would be content to have its experts skilled automata: they must have a reason for the faith that is in them. Dr. Burke, the Principal of the Training College at San Francisco, sets before him three qualities to be cultivated in his students by appropriate exercises. These are power of maintaining discipline, adaptability, intelligence. The interesting point in his scheme is his definition of intelligence in relation to school work—"the power to talk well about it." This apparently inadequate definition implies more than appears on the surface. One cannot talk well about a subject that one does not understand, and though it may not be necessary to talk about it at all, the fact that one can talk about it is a guarantee that one has thought about it, or, in other words, has formed a theory. An apprentice does not acquire an intelligent mastery of his craft by merely imitating what he sees and doing what he is told. Yet there is something attractive in the method of training that a medical friend of mine recommends for his craft under the name of the "polishing of the knocker." By this he means the training a boy necessarily gets by being in a surgery doing odd jobs, even menial jobs. It means nothing more than an application of one of those principles that we get tired of emphasizing in our lectures: begin with the concrete and pass on to the abstract. Applied to the training of teachers the method would imply that the student teacher should become familar with the actual environment in which he is afterwards to work, though the polishing of the knocker represented by sharpening pencils, cleaning blackboards and running errands is not in high favour.

Familiarity with the environment in which they have afterwards to teach is of fundamental importance in the case of those students who come direct to the training college without ever having been in an elementary school. It is impossible for a pupil who has received all his instruction in a secondary school to begin teaching in an elementary school with any chance of success. Here arises a practical problem of the first importance under the new system under which candidates for admission to the colleges are prepared. These will all have had several years experience of a secondary school before they come to college. Now we are told, with some emphasis from different quarters, that the methods of the secondary schools are quite different from those of the elementary. Since young people naturally base their own primitive methods of teaching on the kind of teaching they themselves have received, it follows that the present system will favour the introduction of secondary methods into elementary schools. It is well known that there is a strong belief among elementary teachers that the methods of secondary schools are much inferior to those of elementary schools, so in their view the new system will necessarily be regarded with some suspicion. It is not sufficiently realized that the two methods cannot be judged by a common standard. Size of class makes a practical and very important, though not necessarily a permanent, difference in the conditions of the two cases. On the other hand, the age of the pupils and their social environment make differences that must always be faced in making comparisons between the two systems.

From the standpoint of the colleges there is a compensating factor of the first importance. At present the great majority of student teachers have already had their early training in elementary schools, so that they are in a position, after their secondary course, to compare and contrast the two methods. The master of method has thus two backgrounds against which to project what he has to say on the practical work before his students; and as there is something to be learned from both the secondary and the elementary the student teachers will probably, by bringing the two systems into sharp contrast, do much in the future for the improvement of both. Already their collaboration in the training of student teachers has done something to help the elementary and secondary teachers to come a little closer together, and the future promises still more. The problem of the training of teachers in general will probably be resolved in such a way as to bring together all grades of teachers from the university to the kindergarten.

Considering now mainly the elementary school system for which the great majority of our training colleges are preparing their students, we find something that cannot be better described than as a vicious circle that tends to interfere with the possibility of rapid progress in educational methods. There is a sentence that has done, and is doing, more harm to educational progress than the most reactionary memorandum that was ever issued from Whitehall. It runs, "That is all very well at the Training College." It is usually followed by an outpouring of worldly wisdom and contemptuous criticism that is disastrous to budding ideals. To be sure, when we deplore this cold douche of a sentence we appear to beg the question, for we assume that the training colleges are up-to-date in their work, and are really able to lead. But to do the pessimists justice, they do not deny that the colleges are in advance. The implication is all the other way: the colleges have advanced too far; they are in the clouds. The attack is not on the colleges as institutions in which bad theories are made. The trouble is that the theories are too good. The chastening sentence practically admits the justice of the position taken up by the colleges: all that it questions is the possibility of carrying out all those admittedly fine ideals in the rough and tumble of ordinary school life. We may be accused of self-satisfaction in assuming that training college methods are in the van of progress; but probably there will be no one to dispute our next claim, that the young student fresh from college is a more likely agent for progress than are his older colleagues. His ideals may not be acceptable to them, but it cannot be denied that he has ideals. His very youth gives him that advantage. The ordinary practical difficulties of school are sufficient in themselves to curb any too exuberant ideals without the cold douche of the reiterated depressing sentence.

The natural reply to our objection is that, after all, the teachers with whom the young beginner works were themselves in many instances trained at a college, and therefore have had their ideals.

But these teachers, too, in their time had the cold douche sentence thrust upon them, and therein consists the vicious circle. It is sometimes said contemptuously that every well-trained elementary teacher believes that educational progress stopped on the day when he left the training college. But it is not quite fair to say that a student who left the training college thirty years ago represents to-day the state of educational theory at the training colleges in 1881. His present attitude rather represents the average between his year of leaving the training college and the year in which those left who administered to him the cold douche. If they left, say in 1851, our present-day teacher probably represents the educational opinion of about 1866. If the scheme worked out in this mathematical way no great objection would need to be made. For, after all, it would imply progress; slow progress, it is true, but still progress in which there would be ample time to consolidate the gains and avoid the losses that might accompany very rapid change. But the trouble is that in the past the tendency has been to cut off all enthusiasm at the very beginning, only the strongly optimistic natures being able to resist the lugubrious croakings of practice-proud experience. Masters of Method often look wistfully forward to the time when the students they have trained will in their turn become head masters, but too often when that time comes the new head masters have become tamed by the buffets of a strenuous professional experience. They have no longer the fresh enthusiasm they carried with them from college. Still, they have often a warm side to the old institution, and are willing to humour their old trainers to a certain extent. All this is hopeful enough, but there is a still more cheering prospect in the more direct connexion being established between the training colleges and the schools. The need for more practice is driving the colleges further afield. The old practising schools did, and are doing, capital work, but they attempted to do much more than was possible. They had to be demonstration schools, model schools, experimental schools, and practice schools all in one. The needs of modern conditions are forcing us to forage for further practice. The older practising schools are being largely used as demonstration schools, while the students are sent for their practice to ordinary good elementary schools where they teach under quite normal circumstances, or circumstances as normal as is possible under the conditions of the case. No one realizes more clearly than the intelligent master of method that it is essential that his students should practise under the same conditions as will prevail in the schools to which they are likely to be called. He does not want exceptional buildings and apparatus, and is often irritated when a government inspector, or an inspector from a county council, reports that certain schools are unsuitable on these accounts for the practice of students. He knows that the thing that matters is the attitude of the teachers towards the students. Given good teachers favourably disposed, the master of method is not too particular about the buildings, the apparatus, or the social class of the children. He knows that if his students can hold their own under adverse conditions they will have no difficulty in easy conditions. Besides, the use of a certain number of schools of this kind enables him to fit his weak and his strong students into suitable teaching conditions.

The fundamental practical problem remains of how to escape from the vicious circle. How are we to help our pupils to apply most speedily and most directly the principles and ideals we have instilled into them? In the first place, we must prepare them for the kind of reception they are likely to meet with in the actual school life that lies before them. They should be familiarized with the cold douche sentence while still in college. This early inoculation with the chill of callous criticism need not unduly depress the student, and in all probability will rouse the fighting instinct in him. In any case, it will put him on his guard, so that the sentence will lose much of its depressing effect It must not be supposed that I am recommending that young people should be sent out with the impression that they are brilliant young missionaries, whose main business is to convert a horde of ignorant head masters and turn them from darkness unto light. My advice to my leaving students is always an emphatic plea for loyalty to their future head teachers, even should these prove to be somewhat behind the times. At the colleges, respect for experience should be instilled, but this is quite compatible with respect for educational progress, and our young people are quite entitled to make respectful claims to have their ideas recognized, so long as these do not interfere with the general scheme of working the whole school. Young teachers must learn to yield with a good grace. They must remember that in a well-managed school better results will be obtained by the uniform adoption of an inferior method, than by the adoption throughout the school of several different methods each better than the uniform inferior one. But there are cases in which the head master has no distinct policy of his own, and these are the cases that offer the young teacher his opportunity. You are aware that at present there is a suspicion that the system of mere inspection does not give so clear an indication of the true state of a school as did the more detailed tests of the individual examination period. Lately several schools have been tested in the old-fashioned thorough way in order to find out how they really stood. The interesting thing is that several of these schools that were regarded as bad, on the strength of mere inspection, turned out to be distinctly good when submitted to detailed examination; and the explanation of this phenomenon is for us specially instructive. The inspectors believe that the general dulness and lack of initiative of the head teachers in these schools gave the impression that they were bad, whereas the very lack of grip on the part of the head master gave scope for the younger members of the staff. If our students leave us primed with sound principles and high ideals, prepared for the inevitable attempts of the pessimists to chill their ardour, willing to be loyal to whatever system is consistently applied in the schools to which they are appointed, and yet ready to take advantage of all opportunities for free action, they will have every chance of escaping from the vicious circle. Is it too much to ask the experienced teacher to do something to help in this process, were it only to do his pessimistic roaring more gently, leaving to actual experience the easy work of lowering ideals? Things are indeed looking rather hopeful here in London at any rate. There are *hundreds* of schools in which training college students practise, and in which, therefore, the staff come into direct contact with the masters and mistresses of method, who are found to prove on acquaintance much more reasonable and, indeed, practical people than they appear to be on paper. The result is that a great many of the teachers become loyal colleagues of their fellows from the training colleges, and, since they are themselves concerned with the training of the young teachers, begin to see that there are possibilities in the case. There is nothing pleasanter than the relation between a master of his craft and the apprentice who is feeling his way, and an increasing number of our practical teachers are experiencing the joy of moulding their successors.

A SKETCH OF A GIRL'S EDUCATION.

THIS essay came into my possession a year or more ago. I may do what I choose with it; I offer it now for the consideration of readers of this Review. The manuscript bears neither name nor date; only conjecture is possible as to its authorship and the occasion on which it was written.

It would appear that the writer shunned recognition, or was careless of it. Perhaps he never contemplated publication. I use the masculine pronoun, for all those (not a large number) of my friends who have looked over the paper have maintained that it certainly came from a man's hand. On nothing else have they been agreed. A very few have confessed that they shared his sentiments; most have repudiated them with scorn or anger. "He is a satirist," some have said; others, "He is a cynic"; one detected "humour"; It is irreverent"; "It is mystical"; "It is nonsense."

To me the nameless writer seems to have expressed himself with conviction—to have meant what he said,—even though there is little or nothing original here. He has repeated (because, apparently, he believed it) what other writers, now not much more generally read than himself, have said before him. He has made up into some sort of mosaic such fragments as he has gathered together of ideals long since shattered. I may be wrong. But, having the liberty, I take the opportunity presented to me by the Editor of submitting the essay to the judgment of any critics who may be attracted by the title.

E. T. CAMPAGNAC.

Humanity is the sum of those qualities, characteristics, gifts, which men and women share with each other, and perhaps with children. It is our humanity which places us higher than the beasts, though lower, if but a little lower, than the angels. Yet humanity is hardly a human attribute ; it might be ascribed rather to the citizens of another realm, who neither marry nor are given in marriage, since they are neither male nor female. But here, in the region of our experience, this supreme distinction exists, and it must dominate every justly-formed scheme of education, as it, in fact, governs every plan and operation which we devise or carry out.

Humanity will take care of itself, if we take care of manhood and womanhood; and the first proposition which I should put before you is that the education of a girl must be directed towards making her, or helping her to become, a woman. It need only be said (no argument is required, I am sure) that in education are to be included all the influences which are deliberately exercised, whether at school or at home, in term or in holidays, for fashioning or moulding a pupil in the image of an ideal conceived with sufficient clearness and held with conviction. So much will perhaps be agreed, but more precision is needed, and we must say what we mean by a woman, before a vague doctrine can become a precept upon which practice may follow.

If man and woman have in common this general nature which we call humanity, yet they are more remarkable for their differences than for their points of likeness. It is not, of course, a question of better or worse—a form of comparison which is wholly out of place and misleading. A man cannot be a woman, and a woman cannot, even if she tries (happily a rare experiment) be a man. She has a mind, often clearer than a man's ; a logic, harder and more severe, though operating upon a somewhat narrow plane ; yet she is often innocent of grammar, though (another contradiction) her speech is more persuasive and compelling than his ; her emotions are more readily expressed, lying nearer the surface ; they are more turbulent and yet more easily composed ; she is fearless upon great occasions, though curiously timid upon slight ; she is as relentless as those forces which we call Natural, as cruel and as capricious. In the tenderest relations, she exhibits savagery, not merely, as would be less surprising, in defence of those whom she loves or is held to love, but even in her treatment of them. She is rarely killed by kindness, but often tortures those who are nearest her and of most account to her. She is often religious, and sometimes moral. For her the spiritual expresses itself, if at all, in outward shape, in the garment of flesh, and her pride is the very bloom of idolatry. Her aim is empire, her hope possession, her weapon charm. And if we ask, where is her empire ? the answer is : her empire is man, her possession is man, she directs her unfailing weapon against man. Yet no individual man may boast of this, nor need lament it. Sought, pursued, captured, he is not valued for himself ; indeed, his personal qualities, whether of mind or body, may be contemptible—he may be ugly, he may be stupid, he may be wicked—no matter; he may be well-made, intelligent, good, it will not increase his worth if he is all this. He is valued as a trophy, and as a symbol—a trophy of war, a symbol grasped in the hand of a realist, who indeed but dimly understands its significance, though she apprehends it with mingled dread and delight. The triumph is personal, but the fruits of triumph are for the race.

A man is at heart, and always, an idealist. His supreme art is adoration. The object of his adoration, after his GOD, is woman; and he has often made his access to his GOD through her, or looked to her to give him (such are the strange uses of our thought and speech) his very GOD. Yet adoration of the mind, like kneeling, the attitude of adoration for the body, cannot be long continued. Fatigue, insensibility, come quickly upon the highest activities of the mind, numbing and dulling it. A shrine is a place to visit, and to leave; to revisit but not to dwell in, save with the aid of memory, and memory itself is subject to the law which governs us, body and spirit, and comes now to a flood of vigour and fullness, and now retreats in languor and decline. Yet the inspiration once caught, and again renewed, never dies, but pulses, strongly now, now feebly, in the heart, and gives a special note or tone to the whole character in all its manifestations of words said, thoughts framed, deeds attempted or achieved. A man is so swayed, and swayed by a woman. He is not for ever in her presence; he does not desire that, but he is never beyond her reach nor without the sphere of her potent influence. It is with a sense of relief that he goes forth alone, apart from her, for her society while it satisfies also exhausts him; he does not desire her with him in his office, in his study; not always in his hours of relaxation; not in his intercourse with men; yet she lives in his heart, which she holds. He does not possess her; she possesses him. So, though he may do her a thousand wrongs, he venerates her; so she, though she yields her life to him, never yields her heart; or if she does, she disappoints him. His attitude to her is that of a devotee, and a devotee who had surprised the mystery would be a devotee no more. She represents and keeps in custody the hard enduring powers of nature, birth, growth, decay, and birth once more. He is more spiritual, gentler, more sensitive to pain as well as to pleasure; more fickle, and yet more faithful, for he owns allegiance, while she neither offers nor admits it.

If we admit so much, the next step in our argument is clearly marked out for us. There are two questions for educationalists as for other human beings: the first, what do you desire to do? the second, how do you propose to do it?

If we desire to make or help to make a woman (as I have described her) what must be our procedure? Largely, it must consist in doing nothing at all, in resolutely declining to interfere with or check natural developments whose operation we cannot wholly neutralize, though we may divert or misdirect them. Whether we like what Nature is doing for us or not, we shall not throw ourselves into petty and futile conflict with her. But if we accept her own standards, if we believe that what will be will be, and what will be will be *best*, then we may perhaps aid in the fulfilment of her agelong design.

I said that the instrument which woman uses in pursuit of her object is charm. What may we do to temper and sharpen the instrument, to improve her skill in using it?

Charm reveals itself in many ways. For convenience we may say that it is shown in the body, in the mind, and in the soul, though to be sure it cannot lie present and revealed in any one of these without being confessed and recognized in the others. Charm of the body is beauty, of outline, of texture and colour, and of carriage and pose. All children have great charm in these kinds, and most grown-up people have some.

A generous and a just education for a girl would teach her to cultivate her physical gifts and to improve them. Health is the condition, the prime condition, of beauty, and a girl will learn, very little in theory but much in practice and habit, to foster and keep her health. She should learn something of symmetry and proportion from such exercises as dancing and swimming; she should hold herself with ease and dignity; she should run, though not far nor fast, with grace. Some games she may play, such as Nausicaa played upon the seashore; she may play tennis, as it was played twenty years ago; she may perhaps attempt lacrosse, but never hockey or cricket. If she is more than commonly strong, fencing will do her good, and if she is well-to-do, it will be good for her to ride a horse. It is too much to hope that she will abandon her bicycle, but, at any rate, we need not encourage her to use it. Not only will she stand and walk well, but (what seems to be harder) she will sit well.

She will devote much thought to her dress. In this she approaches nearest to artistry, and (in a singular way) to freedom from egoism. More closely knit body and soul than her brothers, she may learn to adorn her person, prompted not by vanity, but by a craving for beauty, and with the curious detachment of a true artist who, while throwing himself into his work, yet stands back (as Euripides reminds us) to survey it with the critic's eyes.

If we pass on to consider what is by convention, though with a misleading suggestion, called intellectual training, it will be well to think, first of all, of speech. All our dealings with the world may be regarded as our conversation with it, a thing of give-and-take, in which we receive as much as we give, and indeed can only take by giving, and give by taking.

A girl's voice should be soft and clear; she should give every word its just value, with a delicate honesty, neither mincing nor blunt; her vocabulary must be simple and chaste; it must be unaffected, and quite free from slang. But she will speak, of course, if she is to speak well, not only with her voice but with her whole face, with eyes smiling or reserved as may be her wish, with lips mobile and moving. She will know, too, the language of gesture, and practise it with naïve and unconscious art.

If she is to speak she must also listen, with a responsive silence, with quick intelligence and understanding. She will have little repartee, she will not be "brisk" or "bright," but she will draw conversation in refreshing draughts as from a perennial spring of happy and quiet thought and limpid, pure observation.

Again, if she is to speak, she must have knowledge, the material of speech; and this she will derive, after talk and listening, next best from books. What books, then, is she to read? Let her be early steeped in faery legend and in romance; the exquisite wit of elves, the chivalrous loves of knights, and the not less chivalrous loves of gentle ladies will form her mind and train her manners. In prose and in poetry she may get this lore. She needs hardly at all to turn to books, as they are called, of "information"—an ordinary girl will acquire more "information," more details of fact, in five minutes than a man will in a day, as she sits in a room, or walks in a street; she needs no artificial aid from teachers for that; and if she is to read history, let it be for romance again; and if she is to get some geography, let it be through the records of adventurous travellers; and she must travel herself, if this can be by any means attained. To set foot upon a foreign soil, to hear and attempt a foreign speech, to observe and compare with her own and those of her own folk, the manners of a foreign people, to appraise their dress, to see their buildings, to eat their food, to join in any of their ceremonies of religion or festivity, or in those gracious rites, which some nations cultivate, of religious gaiety—to do these things is to add to her power by increasing her charm. Happiness is the food of generous natures, and education if it is to be nutritive must be a happy thing. Such reading as I have suggested in books of print and the tenderer books of flesh and blood will give happiness to a girl who is fortunate enough to receive it.

I spoke earlier of a girl's care for her dress. An important part of her education is needlework, in which she must be practised as soon as eyes and fingers are ready for it. To work finely in fine material, to work boldly and yet finely, too, in coarser stuff; to plan and arrange; to fit decoration to construction, and adapt construction to use is, far more than many women seem to imagine, an intellectual exercise and discipline; and a well-trained girl will not neglect this. This is a region where art and economy, too often divorced, are at one; a girl who can sew well will have a shrewder standard of criticism in both than a girl who cannot. Sewing is as necessary for a girl as riding is for a boy.

For other arts we need make less provision. Shall she learn what is called music? Shall she draw and paint? In general, no; at best, in secret. She must be free from parlour tricks and other vices of ostentatious incompetence. If indeed she possesses real ability, it will show itself; but it will show itself all the more certainly and hopefully if in early years, instead of being forced to draw "freehand" and to "practice," she is enabled to see good pictures and to hear good music, without comment or criticism, just as she breathes pure air, without being told that it is pure or being made drearily familiar with the names of its component gases. We guard children against evil with too much anxiety; what we ought to do is to occupy them, their thoughts and their time, with what is good, and if we secure an early familiarization with good pictures and good music, we shall have created already in them a natural repugnance towards what is debased whenever and wherever they may encounter it. This sentiment of what is right is the only soil on which right principles, whether in conduct or in art, can grow.

But we cannot be content in this, the too common way, to sever conduct and art. Life is our highest art, and art, springing from deep sentiment and formed to fine uses, is life's best, because most natural, expression. Already in laying our plans for the physical and the intellectual training of a girl, we have indicated what her spiritual training is to be. This, too, is training in beauty, and spiritual beauty has two qualities—reverence and humility. If the basis of what we have called intellectual training is romance, the foundation of spiritual training is mystery and awful wonder.

When creeds are fervent they are uttered in the passionate language of allegory; when allegory wields its most potent influence it speaks the strong language of a creed—creed and allegory alike discover godhead in the child, and reaching a height more sublime, and sounding a depth more elemental than that of reason, have fastened upon girlhood the winged burden which it cannot cast off, and bearing which it fulfils its destiny and the destiny of our race. Why this burden should be laid on shoulders so weak is a question to which imagination can bring no answer; but for bearing it imagination offers its aid. Humility, the fairest jewel of girlhood, is the crown of womanhood.

These we claim as the elements of a girl's education—a body fair in lithe and lustrous health; a mind apt for beautiful and dignified speech and nurtured in romance; a spirit whose root is deep in the soil of mystery and whose bloom is humility.

MENTAL PROFILES.

A Quantitative Method of expressing Psychological Processes in normal and pathological cases.*

By Priv. Doz, Dr. Med., G. ROSSOLLIMO (Moscow).

In search of a method for the quantitative expression of psychical function in various conditions of the nervous system (healthy and diseased) and in cases of mental backwardness, the author hit upon the following plan of defining quantitatively certain mental processes, both simple and compound.

The method proposes to assess numerically eleven psychical processes, giving to each a maximum of ten. The figure in each case is arrived at by counting successful responses to a series of inquiries. The results are then transferred to a graph, the height of the ordinate giving the proportion between the maximum possible and the actual achievement. (See Figures 1 and 2).

Dr. Rossollimo considers three groups of processes; those falling under

A. Attention and will.
B. Precision and stability of impressions.
C. Associative processes.

But the eleven processes enumerated in the table (Fig. 1) are separately investigated, and each of them from several points of approach.

Thus, I. Attention is examined in reference to

- (*a*) Concentration:
  - i. Capacity to execute a series of simple, straightforward exercises.
  - ii. Capacity to execute a similar series with certain restrictions.
- (*b*) Capacity to resist distraction.

II. Will is tested in respect of its capacity to resist

- i. The tendency to automatism.
- ii. Suggestion.

III. Precision of Visual Impressibility is tested by means of

- i. Subsequent recognition.
- ii. Simple judgment.
- iii. Subsequent reproduction.

IV. Stability of Impression is tested by

- i. Immediate reproduction.
- ii. Subsequent reproduction (1—1½ hrs. later),

both in connexion with

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* *Zür Methodik der quantitativen Untersuchung der psychischen Vorgänge in normalen und pathlogischen Fällen (Eine experimentelle-psychologische Skizze).* Klinik für psychischen und nervöse Krankheiten v. R. Sommer. vi. Bd. Heft 3, 1911.

- (*a*) Visual receptivity in respect of
    - i. Meaningless linear figures (identification method).
    - ii. Meaningless coloured figures (identification method).
    - iii. Pictures (identification method).
    - iv. Coloured pictures (subjects of ten pictures seen three times to be given).
    - v. Objects.
- (*b*) Elements of Speech.
    - i. Letters (visual and auditory receptivity) in series of 10.
    - ii. Syllables (ditto).
    - iii. Words (ditto).
    - iv. Words associated with nonsense syllables (ditto).
    - v. Phrases (ditto).
- (*c*) Numbers.
    - i & ii. Figure numbers in series of 10 (visual and auditory).
    - iii. Numbers of objects represented in drawings in series of 10.
    - iv. Numbers in groups of signs in series of 10.
    - v. Numbers of actual objects in series of 10.

V. COMPREHENSION is tested by means
- i. Of pictures. (*a*) Single. (*b*) Short series of story pictures.
- ii. Of pictures containing absurdities.

VI. COMBINATION (capacity for building up wholes from parts) is tested by
- i. Putting together dissected meaningless drawings.
- ii. Putting together pictures (very simple graduated jigsaws).
- iii. Building up a given design from given equal parts.

VII. MECHANICAL SENSE is tested by means of ten very simple problems in practical mechanical manipulation.

VIII. IMAGINATION is tested by imaginatively filling in the missing parts of drawings, words and phrases.

IX. OBSERVATION, by capacity to find out concealed elements in pictures.

By recording the results of the ten tests under each of the above heads and their sub-divisions an extended profile is obtained, of which Fig. 1 is an example.

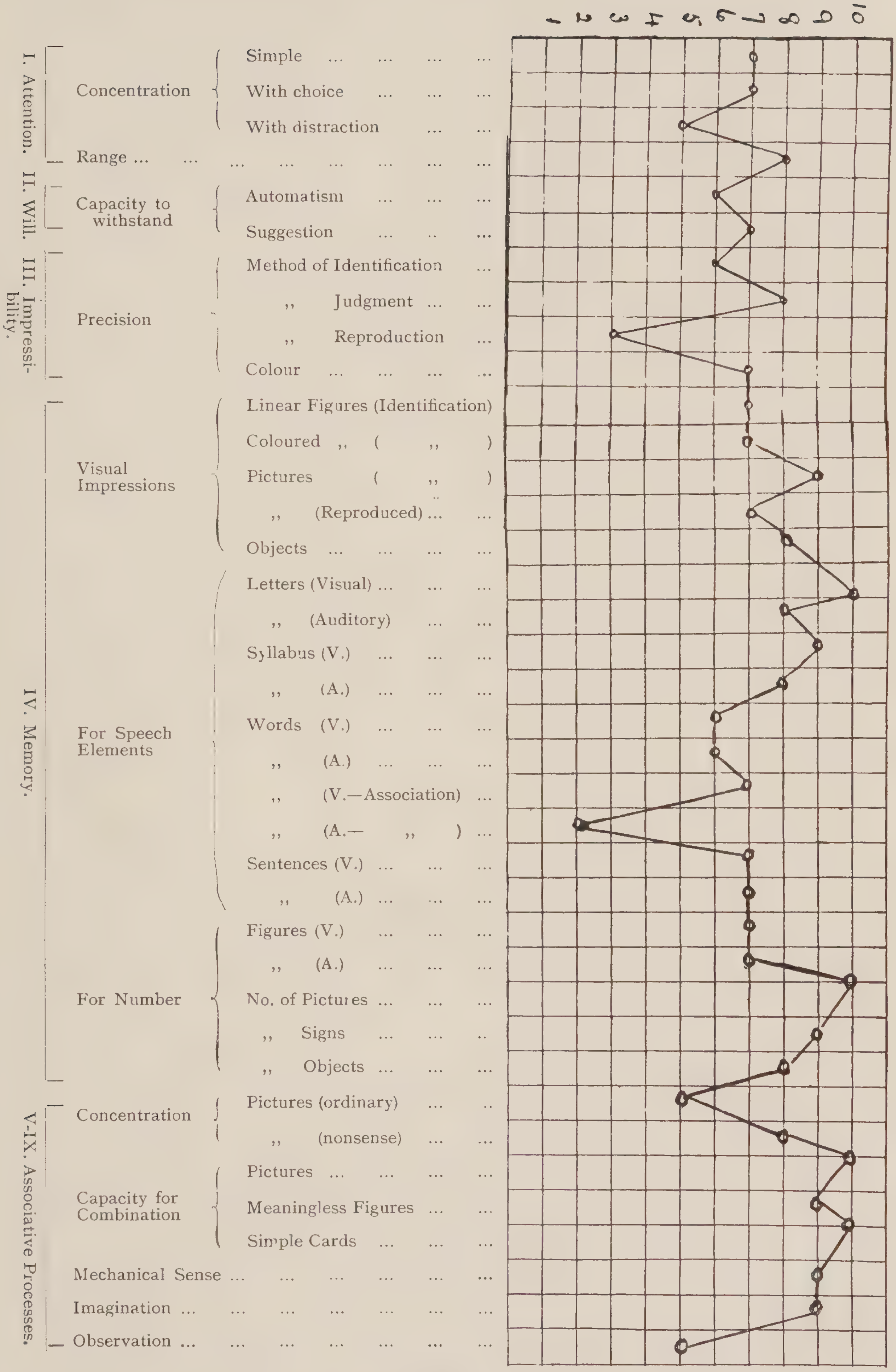

1 2 3 4 5 6 7 8 9 10
I. Attention.
II. Will.
III. Impressibility.
IV. Memory.
V-IX. Associative Processes.
Concentration
Simple
With choice
With distraction
Range
Capacity to withstand
Automatism
Suggestion
Precision
Method of Identification
,, Judgment
,, Reproduction
Colour
Visual Impressions
Linear Figures (Identification)
Coloured ,, (,,)
Pictures (,,)
,, (Reproduced)
Objects
For Speech Elements
Letters (Visual)
,, (Auditory)
Syllabus (V.)
,, (A.)
Words (V.)
,, (A.)
,, (V.—Association)
,, (A.— ,,)
Sentences (V.)
,, (A.)
For Number
Figures (V.)
,, (A.)
No. of Pictures
,, Signs
,, Objects
Concentration
Pictures (ordinary)
,, (nonsense)
Capacity for Combination
Pictures
Meaningless Figures
Simple Cards
Mechanical Sense
Imagination
Observation

Fig. 1.

But as a simplification, the results of the various methods of testing each function are averaged, and the combined results are given as in Fig. 2.

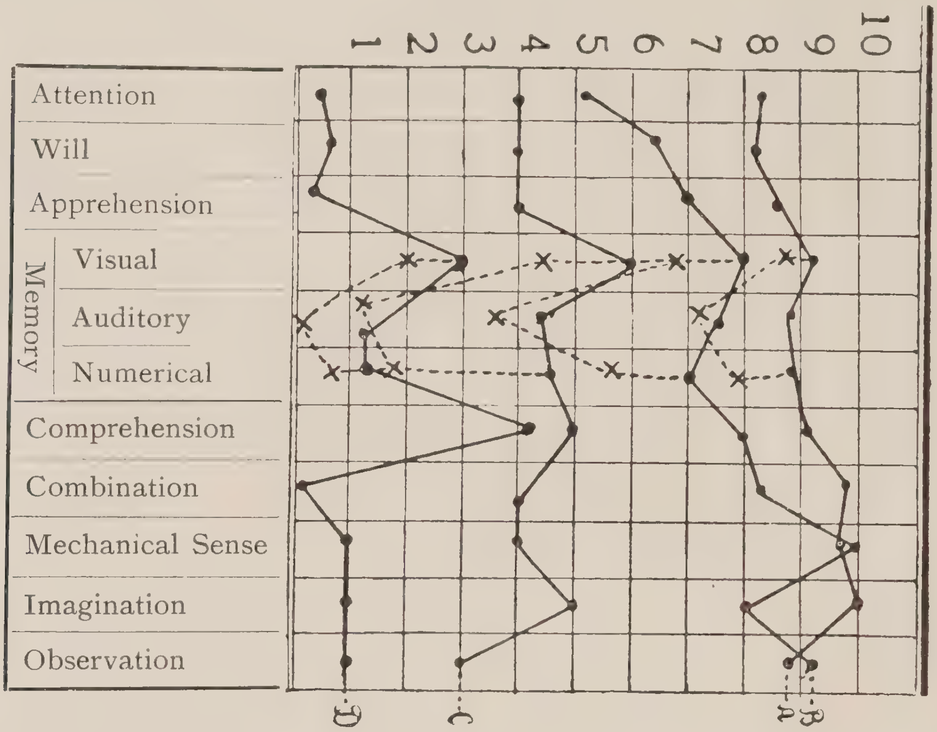


Fig. 2.

In this, the profiles of a normally intelligent person (A), a person of slight defect (B), a person of marked mental deficiency (C), are presented. The dotted lines represent the results of the memory tests after an interval of 1 to 1½ hours.

To express the profile still more succinctly, the author proposes to use a formula made up as follows :—

1. The average height of the profile, obtained by dividing the sum of the individual heights by 11.
2. The average height of each group of processes, A, B, C.
3. The average percentage of forgetfulness.

Dr. Rossollimo thinks this method of comparison of mind with mind is of universal application. From his experience he states that it serves for a child of seven and an old man of seventy; that the degree of development plays a great part, but only in limiting the quantity and quality of the problems accomplished; that it will bring out the precise intellectual imperfection in a case of retardation of development, as well as the characteristics of a university graduate; that changes in the sphere of attention or will during the decline of psychical energy at the period of pubescence, during the first stages of asthenia or other brain diseases, may be equally well shown.

In regard to the method generally, it has proved particularly important to determine the call, so to speak, which each one of the thirty-eight experiments was to make on the individual, with a view to arriving at a fair idea of the maximum to be expected.

The author has found the method reveal an extraordinary variety of varying elements in different personalities, and in the case of nervous disease or mental defect, a large series of characteristic imperfections in the profiles with the measured difference from the normal person has been obtained. It promises, therefore, to be of great use in diagnosis.

A more detailed account of the method will appear in later issues of the Journal.

MEASUREMENT IN EDUCATION *(continued).*

By Dr. P. SANDIFORD, Lecturer in Education, University of Manchester.

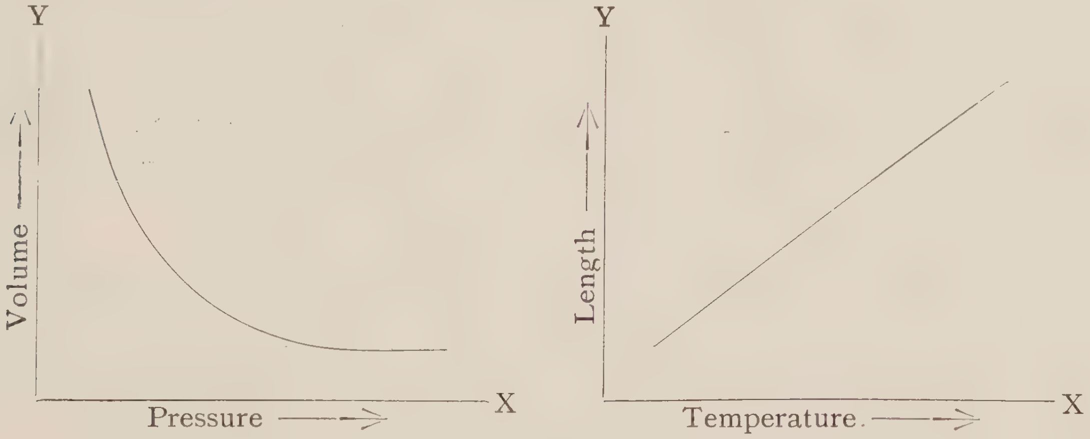
Correlation.

Up to the present we have been dealing with the distributions of single traits. It is often found, however, that traits, both mental and physical, tend to vary together. For example, we know that there is a tendency for weight to vary with height. But the relationship is not perfect, or we should always find that the tallest man was the heaviest, the shortest man the lightest, and so forth. This tendency towards concomitant variation, or the tendency of two or more traits to vary together, is called a correlation. A correlation coefficient is a measure of this tendency. This section will deal with the methods of finding correlations, i.e., of finding how far the variates in one series vary concurrently with those of another.

In the realm of physics the relationships are easy to determine, because they are constant. The physicist knows that the relationship between the pressure and volume of a gas is constant, and may be expressed by the formula:

$$P \times V = \text{a constant.}$$

The variation of the length of a metal rod with temperature is also constant. If measures of volume and pressure, or of length and temperature, are plotted along axes of X and Y, we get figures such as the following:—



In the first case the graphical representation of the facts is a curve; in the second, a straight line. Deviations of experimental measures from the smooth curve or the straight line would be looked upon, and rightly so, as errors of observation.

But in the case of all mental measures the relationship is never, or almost never, the same—it is variable. Hence the difficulty of measurement arises. Some of the difficulties that must be overcome are:—

(*a*) The difficulty of an undistributed zero. This is overcome by using the deviations from the central tendencies of the distributions instead of the crude measures of the two traits.

(*b*) The difficulty of the form of distribution. In general, measures of mental traits approximate the normal distribution, and hence most measures of relationships assume that such is the case. (The Pearson coefficient assumes normal distributions; the Spearman method of ranks, however, assumes that the distribution is rectangular).

(*c*) The difficulty of the form of the relationship. The Pearson coefficient, r, assumes that the relationship is rectilinear, i.e., like the length temperature of metal bar; the correlation ratio, η, measures the correlation correctly, even if it is non-rectilinear or skew.

The following are the more important methods of finding correlations:—

1. The Pearson or Product-Moments Method (r).
2. The Spearman Foot-Rule or R Method.
3. The Method of Unlike Signs.
4. The Correlation Ratio Method (η).
5. The Median or Mid-ratio Method.

1. *The Pearson Coefficient of Correlation* (r) is of historical interest, because it was the first mathematically accurate method found of dealing with the problem. The method of calculating it is long and tedious. Its value ranges from + 1·00 to − 1·00. A correlation of + 1·00 would mean that the two series varied from the central tendencies in exact proportions; a correlation of − 1·00 would mean that the two series varied from the central tendencies in inverse proportions, i.e., in the case under consideration the lightest boy would always be the tallest, the heaviest the shortest, and so on; a zero correlation would mean that there was no causal connection between the two series, that one trait had no influence upon the other.

The formula given originally by Pearson is—

$$r = \frac{\lesssim x . y}{n . \sigma_1 . \sigma_2}$$

where x = the deviations in the first series,
y = the corresponding deviation in the second series,
n = the number of measures,
σ_1 = standard deviation of the first series,
σ_2 = standard deviation of the second series,

$$\text{since } \sigma_1 = \sqrt{\frac{\lesssim x^2}{n}} \quad \text{and} \quad \sigma_2 = \sqrt{\frac{\lesssim y^2}{n}}$$

the formula may be written—

$$r = \frac{\lesssim x . y}{\sqrt{\lesssim x^2 . \lesssim y^2}}$$

The second form is the easier one to use. A good arrangement of the columns in the calculation is shown in Table I (Vol. I, No. 1, p. 34).

The squares of x (or d_1) and y (or d_2) may be read direct from "Barlow's Tables," while "Crelle's Rechentafeln" or a slide rule may be used to find the products of x and y. A Pearson coefficient of such an example as the one under consideration can be worked by a fairly proficient worker in about an hour and a quarter. The final part of the calculation, the labour of which could be reduced by using approximations, is as follows:—

$$r = \frac{\leqq x.y}{\sqrt{\leqq x^2 . \leqq y_2}}$$

$$= \frac{1630 \cdot 49}{\sqrt{644 \cdot 77 \times 14642 \cdot 06}}$$

$$= \frac{1630 \cdot 49}{3073}$$

$$= \cdot 53$$

2. *Spearman's Foot-Rule or R Method* of finding correlation depends on comparison of the ranks (grading) in the two series. The formula given is:—

$$R = 1 - \frac{\leqq g}{c}$$

where g is the numerical gain in the rank of an individual in the second as compared with the first series, and c is the mean value of $\leqq g$ by mere chance. For c, Spearman uses the formula

$$c = \frac{n^2 - 1}{6}$$

where n = the number of cases. When this value of c is substituted in the original formula we get

$$R = 1 - \frac{6. \leqq g}{n^2 - 1}$$

In the example (Table I) the 10th individual in height is 4th with respect to weight. The gain is thus 6 places. Only gains are recorded, and these are set down in column (9). The total gain is 150.

Hence,

$$R = 1 - \frac{6 \times 150}{50^2 - 1}$$

$$= 1 - \frac{900}{2499}$$

$$= 1 - \cdot 36$$

$$= \cdot 64$$

The Spearman coefficient (R) bears a direct relationship to the Pearson coefficient (r), which enables the worker to convert the results obtained by the Foot-Rule Method into those which would have been obtained by the Product-Moments Method. Spearman's Conversion Table is given below:—

Table III.—Spearman Conversion Table.

R	r	R	r	R	r	R	r	R	r
·00	·00	·20	·31	·40	·59	·60	·81	·80	·95
·01	·01	·21	·32	·41	·60	·61	·82	·81	·96
·02	·03	·22	·34	·42	·61	·62	·83	·82	·96
·03	·05	·23	·35	·43	·62	·63	·84	·83	·96
·04	·06	·24	·37	·44	·64	·64	·84	·84	·97
·05	·07	·25	·38	·45	·65	·65	·85	·85	·97
·06	·08	·26	·40	·46	·66	·66	·86	·86	·98
·07	·11	·27	·41	·47	·67	·67	·87	·87	·98
·08	·13	·28	·43	·48	·69	·68	·88	·88	·98
·09	·14	·29	·44	·49	·70	·69	·88	·89	·99
·10	·16	·30	·45	·50	·71	·70	·89	·90	·99
·11	·17	·31	·47	·51	·72	·71	·90	·91	·99
·12	·19	·32	·48	·52	·73	·72	·90	·92	·99
·13	·20	·33	·50	·53	·74	·73	·91	·93	·99
·14	·22	·34	·51	·54	·75	·74	·92	·94	1·00
·15	·23	·35	·52	·55	·76	·75	·93	·95	1·00
·16	·25	·36	·54	·56	·77	·76	·93	·96	1·00
·17	·26	·37	·55	·57	·78	·77	·94	·97	1·00
·18	·28	·38	·56	·58	·79	·78	·94	·98	1·00
·19	·29	·39	·57	·59	·80	·79	·95	·99	1·00

Serious objection has been taken to the Spearman formula by Pearson and Brown because it assumes the rectangular distribution, a form of distribution never, or but extremely rarely, met with in practice.

3. *The Method of Unlike Signs.*—The formula for this method is

$$r = \cos \pi \frac{U}{100}$$

where U = the percentage of unlike signs in the deviations of the two series, and $\pi = 180$.[*] cos π is constant, hence a table giving r for the various percentages of U may be constructed. Such a table is given below:—

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[*] This formula may be derived from Yule's formula for correlation of presence and absence.

$$r = \frac{ad - bc}{ad + bc}$$

where a = number of cases in which both traits are present.
b = number of cases in which first trait is present and second absent.
c = number of cases in which second trait is present and first absent.
d – number of cases in which both traits are absent.

The above formula may be modified thus:

$$r = \sin \left(\frac{\pi}{2} \frac{\sqrt{ad} - \sqrt{bc}}{\sqrt{ad} + \sqrt{bc}} \right)$$

$$\text{Since } \sin A = \cos \left(\frac{\pi}{2} - A \right)$$

$$r = \cos \left[\frac{\pi}{2} - \frac{\pi}{2} \frac{\sqrt{ad} - \sqrt{bc}}{\sqrt{ad} + \sqrt{bc}} \right]$$

$$= \cos \frac{\pi}{2} \left(1 - \frac{\sqrt{ad} - \sqrt{bc}}{\sqrt{ad} + \sqrt{bc}} \right)$$

$$- \cos \frac{\pi}{2} \left(\frac{2 \sqrt{bc}}{\sqrt{ad} + \sqrt{bc}} \right)$$

$$= \cos \pi \frac{\sqrt{bc}}{\sqrt{ad} + \sqrt{bc}}$$

and for practically substituting the arithmetical for the geometrical mean we get

$$r = \cos \pi \frac{U}{L. + U}$$

where U = % of unlike signs.
L = % of like signs.
and since L + U = 100

$$r = \cos \pi \frac{U}{100}$$

Table IV.—Table for Cos π U Correlation.

If U is greater than 50, first subtract it from 100, then prefix the minus sign to correlation indicated.

% U	R	% U	R	% U	R
0	1·0000	17	·8602	34	·4819
1	·9996	18	·8439	35	·4542
2	·9982	19	·8268	36	·4260
3	·9953	20	·8089	37	·3973
4	·9924	21	·7902	38	·3682
5	·9880	22	·7707	39	·3387
6	·9826	23	·7504	40	·3089
7	·9762	24	·7293	41	·2738
8	·9688	25	·7074	42	·2485
9	·9604	26	·6848	43	·2180
10	·9510	27	·6615	44	·1873
11	·9407	28	·6375	45	·1564
12	·9295	29	·6129	46	·1253
13	·9174	30	·5877	47	·0941
14	·9044	31	·5620	48	·0628
15	·8905	32	·5358	49	·0314
16	·8757	33	·5091	50	·0000

In the example, the unlike signed pairs of columns (3) and (6) of Table I, number 17. This makes 34% which corresponds to r = ·4819.

4. The Correlation Ratio Method (η).—The correlation ratio (η) is defined as the ratio of the standard deviation of the means of the arrays ($\leqq$) to the total standard deviation (σ).

$$\eta = \frac{\leqq}{\sigma}$$

The following example (slightly modified) taken from Brown, *Mental Measurement* (p. 136) will illustrate the method of calculation.

Table V.—86 Boys, aged 11-12 years.

Correlation between speed and accuracy in the addition of groups of 10 single digits. Two tests of five minutes duration each.

Correlation Table.

Speed of addition (x) ——>

Accuracy of addition (y). ↓

	1	2	3	4	5	6	7	8	TOTALS (N y)
0–4	—	3	·5	·5	1	—	—	1	6
5	1	1	1	1	—	—	—	—	4
6	—	2	·5	·5	—	—	—	—	3
7	·5	2·5	1	1·5	1·5	2	—	—	9
8	—	3	2	4	5	3	—	1	18
9	1	4·5	4·5	5·5	5·5	3	·5	·5	25
10	1	2·5	5	5	2·5	2·5	2	·5	21
TOTALS (N x)	3·5	18·5	14·5	18	15·5	10·5	2·5	3	86
Means of Arrays	8·3	7·5	8·9	8·8	8·7	8·5	10·3	6·7	

It is rather unfortunate that a boy has been divided between two scores, but the table is almost self-explanatory. Thus, a boy scoring 4 for speed obtains 5 for accuracy; 3 boys obtaining 6 for speed score 8 for accuracy, and so forth. A vertical or horizontal column is known as an array. The means of the vertical arrays are 8·3, 7·5, 8·9, &c. If these are arranged in order of merit the S.D. may be easily calculated as is shown below:—

Frequency.	Deviations (d) from guessed average of 8·5.	n × d²
3 cases at 6·7	− 1·8	9·75
18·5 „ 7·5	− 1·	18·5
3·5 „ 8·3	− ·2	·12
10·5 „ 8·5		
15·5 „ 8·7	+ ·2	·62
18· „ 8·8	+ ·3	1·62
14·5 „ 8·9	+ ·4	2·32
2·5 „ 10·3	+ 1·8	8·1
	TOTAL ...	**41·03**

$$\leqq = \sqrt{\frac{\leqq d^2}{n}} = \sqrt{\frac{41\cdot03}{86}} = \cdot693$$

The total standard deviation (σ) calculation is given below :—

Frequency (n)	Deviation of y (d).	n × d²
6	− 5·5	181·5
4	− 3	36
3	− 2	12
9	− 1	9
18	0	—
25	+ 1	25
21	+ 2	84
86	TOTAL...	**347·5**

$$\sigma = \sqrt{\frac{\Sigma d^2}{n}} = \sqrt{\frac{347\cdot5}{86}} = 2\cdot01$$

hence, $\eta = \frac{\Sigma}{\sigma} = \frac{\cdot693}{2\cdot01} = \cdot34$

5. *The Median or Mid-ratio Method.*—This fifth method of finding the correlation (Galton) between two distributions is heartily approved by Thorndike, both an account of its reliability and of its simplicity of calculation. The method is what it professes to be, namely, that of finding the mid-ratio of the $\frac{x}{y}$ and the $\frac{y}{x}$ ratios. Let us take the following simple example from Thorndike's "Empirical Studies in the Theory of Measurement," where these paired values for x and y are given :—

x	y	x	y	x	y
−7	−5	−1	−3	+1	+7
−5	−5	−1	−1	+3	−1
−5	−3	−1	+1	+3	+1
−5	−1	−1	+1	+3	+1
−3	−7	−1	+3	+3	+3
−3	−3	+1	−3	+3	+5
−3	−3	+1	−1	+5	−1
−3	−1	+1	+1	+5	+3
−3	+1	+1	+3	+5	+3
−1	−5	+1	+5	+7	+5

The directions for calculation as given by Thorndike are : "First, one makes an exact median sectioning of the x's and the y's and then counts the cases that give negative ratios. By inspection one then chooses for the $\frac{y}{x}$ ratios an approximate median (say $\frac{1}{3}$), and for convenience draws a line to include these cases and counts them. One then increases their number by adding the cases of the next smallest ratios not included, or by taking away the cases of the largest ratios included until one reaches the Median ratio. One then repeats the process of guessing at an approximate median for the $\frac{y}{x}$ ratios and correcting it." A sample calculation of the above is given below:—

FIG. III.

y ↓ \ x →	−7	−5	−3	−1	+1	+3	+5	+7
−7			1					
−5	1	1		1				
−3		1	2	1	1			
−1		1	1	1	1	1	1	
+1			1	2	1	2		
+3				1	1	1	2	
+5					1	1		1
+7					1			

N = 30 $\frac{1}{2}$ N = 15

negative < (o) 8

$\frac{y}{x}$

$\nless \frac{1}{3} = 4$

$\frac{3}{5} = 3$

hence, Median $\frac{y}{x} = \frac{3}{5}$

negative 8

$\frac{x}{y}$

$\nless \frac{1}{3} = 5$

$\frac{3}{5} = 2$

Median $\frac{x}{y} = \frac{3}{5}$

∴ Median Ratio = ·6

The above examples give illustrations of the calculation of the three things—central tendencies, variabilities, and correlations—which occur most frequently in mental measurements. But the maxim "learn by doing" has peculiar applicability to statistical treatment of measurements, hence the reader, if he should get so far in this dry article, is strongly advised to make simple calculations of the type shown. He is also recommended to make a careful study of two or three typical investigations along these lines. The study of Thorndike on "Handwriting,"* in which a measuring stick or scale for children's handwriting is made, and Cattell's "A Statistical Study of American Men of Science,"† can both be confidently recommended for the purpose.

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* Teachers' College Record, Vol. XI, No. 2.
† Science, N.S., Vol. XXIV, Nos. 621, 622, 623.

A NOTE ON BACKWARD CHILDREN, II.

THE figures which were cited in the November issue of this journal suggested that from 5 to 6 per cent. of the children in the elementary schools were seriously behind the normal rate of progress through the school. Dr. Kerr, the chief of the Schools' Medical Officers of the London County Council, has since drawn my attention to his report for the year ending March 31st, 1906, in which he found 12 per cent. backward. His figures must, however, speak for themselves. The report runs:

"By the time children have passed their tenth birthday, accident or chance, opportunity and ability have distributed them all over the schools. The ten-year-olds in our results were distributed as follows:—

Standards ...	I	II	III	IV	V	VI	VII	TOTALS.
Girls: Series A	20	60	156	177	127	6	...	546
,, ,, B	19	33	234	251	94	12	...	643
Boys: Series A	19	58	134	157	54	10	4	436
,, ,, B	22	53	183	275	153	23	1	710
TOTALS ...	80	204	707	860	428	51	5	2335

Of these 2,335, representing average samples, no fewer than 284 have got three years behind educationally; that is, 12 per cent. of the whole are evidently not profiting as they should from the education offered." The report adds that the "12 per cent. dullards are also nearly all below mean height, whilst the two or three per cent. exceptionally clever or precocious children are generally above the mean."

From the figures themselves it does not appear that the 12 per cent. were *three years* behind the average or normal rate of progress, but they would certainly fall into the two years' standard for backwardness suggested in my previous note. The percentage is in any case notably higher than that given by any other figures which have come before my notice. They emphasize the great importance of the problem.

How intimate the question of the relation between backwardness at school and minor offences against the social order may be is suggested by the following table, kindly supplied to me by the Governor of one of H.M. prisons.

It appears that the standard of education of short-time prisoners is ascertained by the prison chaplain, and the table relates only to what is called the local side of the prison, that is to say, to those undergoing sentences of seven days and upwards without being sent to the convict prison.

STANDARD

Nil	I	II	III	IV	V	VI	VII	Superior	Total
1,070	1,156	2,806	1,280	476	44	11	4	14	6,861

The figures are for men only, and for the year ending Dec. 31st, 1911. We may, I think, not unreasonably assume that all below the fourth standard, that is to say, 6,312 of these unfortunate men (91 per cent. of the whole number) were amongst the backward boys in their school days. Even if we incline to think that the interval between leaving school and going to prison might reduce the school accomplishments of a Standard VI boy to the level of Standard II, we still have 5,032, i.e., 73 per cent. of the total who must have been in the category of school failures. Some 10 or 12 per cent. of them were probably feeble-minded, and from the outset ineducable. What of the remaining 60 per cent.?

Are we to assume that these could not have been saved? Their offences are not the offences of the criminal class properly so called, but rather the lapses due to the want of self-respect which school failure tends to undermine. No doubt irregular attendance at school is responsible for backwardness in a relatively small proportion of cases. Thus, of 1,217 backward children whose names were reported in a recent enquiry, the teachers assigned irregularity as partially responsible for the position of 419.* But there still remains the large residue for whom something might and should be done.

The problem has been tackled most systematically, perhaps, in the German city of Mannheim, thanks to the enterprise of the Director of Education in that city—Dr. Sickinger. For this purpose schools are grouped in the various city areas, and the children who, at the end of the school year, are not ready for promotion are sent to a large central school where, alongside the ordinary classes, there are special classes for the assistance of weaklings. Repetition classes they are called. These classes are small (20 to 25 pupils in practice, with an upper limit of 35), and in charge of teachers specially qualified by temperament to deal with them. Moreover, the actual number of hours spent at school is commonly reduced. Instead of being in school from 8 to 12, the weaker children in each class attend from 8 to 11, and the more advanced from 9 to 12. Thus, the teacher can give each group special attention at the beginning or at the end of the morning.

The aim of the teacher is to restore the pupil to the normal class line. If ill-health or irregularity has been the cause of his degrading, this result is commonly attained, but should he not make up the leeway he has lost, he advances through the series of Repetition classes, finishing his school career in that line unless the return to the larger classes has been possible in the meantime. The diagram below represents the Mannheim scheme.

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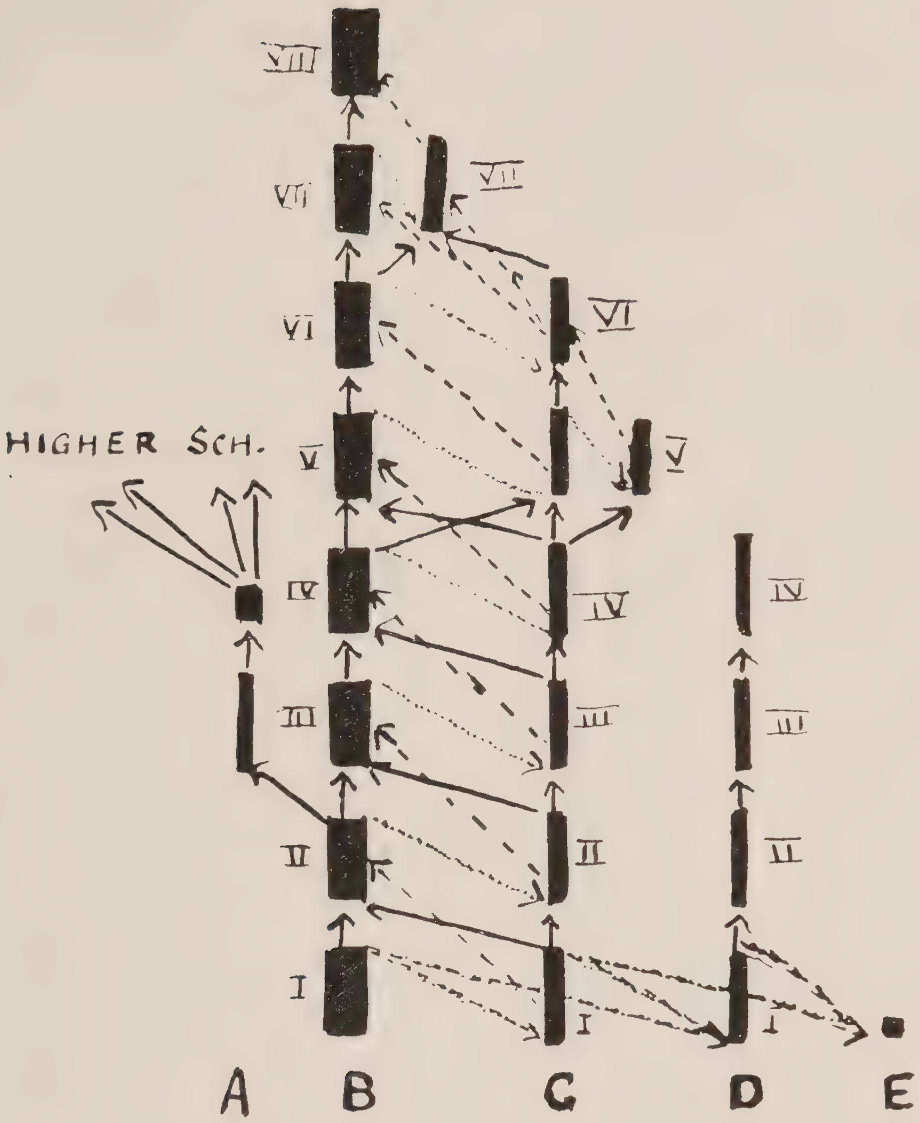
*The standard of irregularity was not fixed, and it is clear from the returns that teachers vary greatly in their estimate of it.



The normal progress of a boy through the primary school is represented by line B. The arrows in both directions from line B to line C represent the passage of a pupil from the ordinary series of promotions to the repetition classes and vice versa. The D line has only four classes. This represents the classification of the schools for mentally deficient children, whilst the small square marked E stands for the entirely ineducable imbeciles who are not even fit for the schools D.

It will be noted further that special arrangements are made for rounding off the courses of the boys who never recover the year or years which they have lost. A thirteen-year-old boy who has just finished C IV does not go into C V, but into a special class in which he receives more definite preparation for the time when he leaves school altogether and begins to earn his living. The same function is fulfilled by class VII between columns B and C. The A column should also be explained, though it is not pertinent to the subject under discussion. It represents the brighter children who receive special instruction in view of their intention to proceed to one or other of the Secondary Schools [Gymnasium, Oberrealschule, Progymnasium and Realschule].

Incidentally one may remark, in respect of the advantages of some such scheme in the large urban centres where alone it is possible, that diagnosis of feeblemindedness would be much more satisfactory than it is at present.* If a child fails in this second line, there is time to find out why, and transference to the special schools is not decided upon during an interview which rarely exceeds five minutes. The fact that the repetition classes are what their name implies is perhaps the most serious weakness of the Mannheim system. It would, perhaps, hardly be fair to deprive the pupils of the opportunities of getting once again into the line of normal movement, but whether that might not be more effectively accomplished through the agency of meaningful activities than through the painstaking analysis of sound and number is a question which deserves, at any rate, experimental investigation.

In the treatment of backward children we need above all things to cherish self-respect, to find out what a lad can do, and give him opportunities for excelling in it. Thring's doctrine can, however, only influence the organization of the primary schools when the bonds of the time table have been loosened and current ideas of discipline have been revised.

J.A.G.

THE TEACHING OF ENGLISH.

I. Grammar.

BY PROFESSOR J. A. GREEN

IT is with serious misgiving that I venture to write some notes upon a subject which has occupied so much of the attention of practical teachers and of people in high quarters in recent times. But so much of what has been said and written is based upon *a priori* principles, or upon the point of view of the English expert as he is turned out by the Universities, that a plea from the point of view of psychology may not be altogether out of place. Psychology is after all the only means we have at present for collating and testing the opinions of experts in our profession, and that such collation is necessary will, I hope, be made clear by a consideration of some of the contradictions which distinguish the present position.

The happiest sign of the times is surely the fact that teachers are waking to the importance of English in school. If only they will give us genuine chips from their workshops we may hope ultimately to emerge from the present chaos of practice. We are apt, however, to consider method too exclusively from the standpoint of our successes; until we can frankly abandon that attitude and study our failures in the open we shall never really arrive at sound doctrine. Even Memoranda from the Board of Education must rank second in importance to systematic studies such as I conceive to be possible. In the meantime we may offer a cordial welcome to such reports as that issued by a Special Committee brought together by the London County Council for the purpose of drawing up a statement of the principles which should guide teachers in London Elementary Schools. That it contains the fruit of much sound doctrine and wise experience goes without saying. It is a real contribution to the literature of the subject.*

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* Cp. Report of Special Committee to Education Section (British Association), to be published in "Transactions" for 1911. The writer has a few spare copies of this report which he would be glad to send to anyone interested.

In spite of that there are certain fundamental difficulties in the treatment of English which the Report does not seem to solve satisfactorily, especially in relation to Grammar. Whatever view we take about the question whether Grammar should or should not be included in the curriculum of the Primary Schools, we shall surely agree that any Grammar we teach should be free from error, express or implied. Let us then consider some of the conclusions of the Committee from this point of view. One of the chief virtues of their Report is its definiteness. It is rarely, if ever, vague and "viewy," and we can therefore come to grips with it.

On the question of the grammatical analysis of sentences, they say:—

"As we made the sentence the unit in the teaching of composition, we should begin Grammar with an examination of the sentence. At first, we would divide it into its two constituent parts of subject and predicate, and the subject should be recognized before the predicate. This view of analysis puts it in its correct position as the converse of synthesis, that is of composition. In synthesis, the child expresses ideas about something. It may be: "The river flows gently towards the sea." The subject, the idea of river, comes into consciousness first. The affirmation follows it. Therefore, the familiar, and far from obsolete instruction: Find the verb and ask yourselves "who?" or "what?" should be discarded as placing classification before the examination of function. The pupils should be directed to inquire what engaged the attention of the mind (i.e., the river) before the sentence under examination was framed. The subject then emerges in its true position."

I shall, for the moment, leave aside the particular procedure advocated by the Committee in the analysis of sentences; but as they have given a reason for it, it is possible to look a little deeper. We are asked to consider the mental processes involved. Indeed, they have given an account of them, though it is such an account as, I think, no psychologist would accept.

There is, of course, no doubt about what takes place in the mind of a child set to write a composition on some subject about which he knows very little, and cares still less. He is trying to put together sentences about a horse. We get: "The horse is a useful animal; he pulls carts and he carries his master on his back. The horse eats grass in the fields in summer, but the horse is in the stable in winter. He eats hay and corn." This is synthesis indeed; precisely the kind of composition in which the subject of every sentence is in consciousness waiting quietly until certain muscular and touch sensations (biting the end of the penholder) give a cue to some likely appendage, which he will subsequently learn to call a predicate! But when a child has anything to say he neither thinks nor talks like that. This sort of thing is what comes from sentence-building and all those allied exercises in formalism out of which school compositions grow. Human nature refuses to be bound by such trammels whenever it is really free, and the best sentence-maker in the primary school drops such formulæ whenever he is talking or writing at his ease.

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* The Report was issued in October, 1909.

It would be an interesting experiment if the signatories to this Report would inquire of any group of children, unspoiled by current grammatical procedure, "what first engaged the attention of the mind" before each of the following sentences were framed:—

> I am sure you will be pleased with the performance.
> As we came along we saw an old man tottering under a burden much too heavy for him.
> His beard was very thick and grey, of a fortnight's growth they guessed.

Perhaps the more familiar type of question—What are we talking about in each of these cases?—would serve the purpose better, though I have tried it in both ways, before a gathering of teachers who were unwilling to be convinced, and have never found a child who failed to say, "the performance," "the old man and his burden," "the beard" respectively. But we need not go outside the Committee's own example, "The river flows gently towards the sea"; is it not entirely a matter of circumstance whether it was the river, the gentleness of the stream, or the sea, which occupied consciousness first?

The examples which I have given are typical of current speech; they are not cases of rhetorical inversion. They show, of course, if that were necessary, that the Committee's reason for the particular method of sentence analysis which is advocated is unsound, and do they not point to a distinction of prime importance in clear thinking about Grammar? Do they not show that the subject of a sentence, in the sense indicated by the Committee, is not always the subject of the verb? The point is so obvious, indeed, that it would hardly be worth making if the error did not lie at the root of much radically bad procedure. So, too, with the Committee's mistake about the antithetical relation between "Analysis" and "Composition." Until teachers have cleared their minds of the view that Composition is merely, or even chiefly, a synthetic process, very little real advance can be expected in this side of English teaching. The *natural* process of "sentence making" is as much an act of analysis as it is of synthesis. Our minds are full of a particular situation—we begin to speak or to write about it; in so doing, the various elements emerge. Until we speak or write, we are simply conscious of a total attitude of mind which engages our attention; as we continue to attend, various details issue in the form of sentences, of which there may be a whole series in which the several grammatical subjects and that "which is engaging the attention of the mind" do not once coincide. In this wise, paragraphs are evolved, whole essays are matured. They develop out of the analysis of our mental attitudes. The babe's progress from *Mamma, knee*, to *Please, Mother, may I sit on your knee?* is not one of putting words together. He has analysed a complex situation, and the resulting synthesis owes all its force to the completeness and delicacy of that analysis.

It would be well, then, if we could find some way of avoiding the confusion of thought which arises from this ambiguous (or inaccurate) use of the word subject. The subject of a sentence is one thing, the subject of the verb is another. They may happen to be the same, but the distinction should surely be maintained.

The Committee does not seem much happier when it passes from its discussion of the principles of analysis to the notion of the noun, the "name-word," and of the verb, the "statement-word." It appears that Sir Joshua Fitch commended such a scheme of instruction thirty years ago, adding that the main principles could be taught in three lessons, *and taught intelligently*. How, in the name of all that is intelligent, we are to teach a child to discover the "statement-word" in such a sentence as "it is desirable that the book should be carefully read by all concerned," I have never been able to fathom. What is the "statement-word" in, "The predominantly flexionless character of modern English renders a terminology based upon those of synthetic languages useless," to adopt one of the Committee's own sentences? Surely no words can express too strongly the sense of utter helplessness which comes to one who is trying to give intelligent instruction, and is at the same time condemned to use meaningless phrases of that kind. A certain number of quick-witted children pierce the disguise of our misleading definitions, and discover the verbs in their sentences with unfailing accuracy, but in such cases it is in spite of instruction that they go right. Moreover, which is the "name-word" in the sentence, "Birds fly"? "Fly" is surely just as much a "name-word" as its subject, "Birds." It is the name of an action, that is all.

The current definitions of parts of speech are misleading, because they offend against the laws of clear thought. "A noun is the name of anything," says the definition, but in practice we are told it is not meant to include words like brown, heavy, walk—names of qualities and names of actions—as they are commonly used in sentences. Yet, in actual use, they *are* names. Old-fashioned grammars recognized this by calling words like brown, heavy—nouns-adjective. Similarly none of the current definitions of a verb will stand practical examination, and grammarians have before now been reduced to such content-less formulae, as "a verb is *the* word in the sentence."

If Grammar is to be taught in the primary schools, the whole of the traditional categories need revision, and some must be abandoned altogether. The wooden schemes of analysis and parsing, into which the facts of free oral and written speech are at present forced, are misleading, and discussion which looks at difficulties fairly may become too difficult for children.

Yet the Committee think great things are possible from the teaching of Grammar. It may, in their view, when most efficient, guide the pupils to the stage of "unconscious correctness" when accuracy in speech and writing is a "reflex operation." In the example from a child's essay, already quoted, the grammar is perfect, and we all know scores of lads in the primary school who can turn out stuff like that as if it were a "reflex operation." They never make a grammatical mistake; their concords are faultless, they venture occasionally on relative clauses without mixing up who and which, but their compositions bore the reader to death. They are soul-less syntheses. The fact is, of course, that compositions should be judged primarily from the point of view of the message, and that is not a question of grammar. The form of the message may be improved, but we do not estimate that chiefly on grammatical grounds, but on grounds of clearness, simplicity and sincerity.

But after all, this question need not remain one of opinion. It may easily be made the subject of experimental inquiry. London is a large area from which groups of schools of like type can be chosen. Given teachers approximately equal in calibre and in professional interest, can we not have two comparable groups of schools set to work out the problem? After five or six years, we might be in a position to see whether formal grammar had made any real difference to linguistic power; whether the time spared from formal grammar and its attendant exercises, and given to reading and writing did not prove to be more profitably spent. At the least, we might hope to be in a position to found our opinions upon experiences carefully controlled and described.

This brings us to another difficulty which the Committee's Report shares with most documents of the kind. It rests upon the expert "opinion" of the members of the Committee itself, and the weight to be attached to the document depends entirely upon their individual reputation as successful teachers. Unfortunately, "expert" opinion in our profession is discounted by the fact that there are no objective means of estimating its value. We hear that good "results" have come from employing this, that, and the other device, but exactly what the results were, and under what conditions they were achieved, is rarely, if ever, given. It would be enormously valuable if some of our great educational authorities would provide the machinery for careful experimental inquiries, in which every factor affecting the work done was, as far as possible, recorded, and every stage of its progress was set down with scrupulous attention to detail. Only in that way can we ever expect to achieve a professional opinion which is beyond the reproach of mere impressionism.

But however strongly we may emphasize the defects of such a Report as that issued by the L.C.C. Committee, they apply with still greater force to "Suggestions" and "Memoranda" from the Board of Education, so far at least as they concern Methods of Teaching. That the Board is actuated by the consciousness of much bad work which its officers find all over the country, may be granted, and nobody will dispute the fact that its knowledge of the actual condition of things is wider than the knowledge of any Local Authority can possibly be. But I would urge that good work will never come from relieving schoolmasters from the necessity of thinking for themselves. It will be said, of course, that the Board only issues "Suggestions" for the consideration of teachers. However much it may deprecate the attitude of mind with which schoolmasters approach its official documents, it is, and always must be, the attitude of mind of persons receiving instructions. Moreover, the Board itself has in the case of primary teachers actually prescribed its "Suggestions" as a textbook for the study of Methods of Teaching. "Suggestions" which receive the *imprimatur* of the Board are suggestions in name only, to the majority of schoolmasters. The Board's pronouncements become the professional Bible, and, "it is in the Suggestions," rapidly becomes the last word in a professional discussion.

It may be urged that such official publications have apparently justified themselves in the improved methods which have followed in the schools as a whole. The only possible reply must be that a mechanical teacher will quickly reduce the most enlightened external suggestions to formulæ none the less barren because they are more pretentious and elaborate than his old ones were, and that those teachers who think about their work are better left to find their own salvation, in the light of free professional discussion, brought to bear upon their own particular problem. It is not only an injury to them, it is an injury to educational progress in the long run, to do anything which deprives the schoolmaster of the responsibility for doing his own thinking.

The danger is all the more serious because even the Board's memoranda do not rest upon any available evidence. They are at best an expression of the highest professional "opinion," though for this, we must take them on trust. Being of necessity anonymous documents, there is no means of estimating their worth in terms of their writers' professional reputation—a fact which should, we think, give pause to the Board in authorizing them.

The recent circular on the Teaching of English in Secondary Schools deals, in the main, with the problems of Teaching Literature and Composition. Grammar is treated with very scant respect.

"There is no such thing as English Grammar in the sense which used to be attached to that term." "Whole lesson periods should not be given up to formal grammar." The London Committee hold a very different view, though they are, of course, thinking of Primary School children. From 9 to 11 they would give thirty minutes a week to the subject, and from 11 to 14 they would devote a whole hour weekly to it. "Parsing," says the Board of Education, "is mere drill, and should not be made into a regular feature of the instruction at any stage of the school course." "Parsing must follow . . . analysis. It should be treated broadly and simply . . . Such forms of speech as the relative pronouns, the auxiliaries, and the infinitive forms must be treated in considerable detail in the senior classes, if the scholars are ever to write really good idiomatic English"—such is the considered opinion of the London Committee. In spite of the different types of schools that are referred to, there is here a clash of opinion which discussion may never settle. We need a carefully-ordered experiment, covering a series of years and a fairly wide area, before any authority can reasonably call upon a single teacher to retract his particular views on the subject.

(To be continued.)

SOME PROBLEMS IN THE TRAINING OF THE TEACHER.

A Symposium.

WE Training College people are apt to think and talk too much about Regulations and Boards. Our annual conferences would surely gain in interest if we could forget those set in authority for a time and consider our work from a wholly independent point of view. The interchange of ideas on the real problem that faces us—how to turn out thinking men and women ready for the professional freedom which is theirs for the asking—might surely occupy us very profitably once a year. There is activity enough in Training Colleges and University Departments of Education devoted to the study of the problems of pedagogy and educational psychology, and there is great variety of opinion and of procedure. All this is excellent, but we need interchange of views very badly, and it would be good if that could be face to face. Failing that, or preparatory thereto, the Editor hopes it may be possible to arrange a symposium which may prove serviceable. Professor Findlay has kindly consented to open such a discussion.

"METHOD IN TEACHING."

BY PROFESSOR J. J. FINDLAY, M.A., PH.D.

The question of "Method in Teaching" is opportune enough, for of late we have had several important contributions, and I can best introduce the subject by referring to these.

Firstly, the preliminary chapters in Welton, *Principles of Teaching* (1906, Clive & Co.) were brief but very helpful. In the same year Lang's *Primer of General Method* (Copp, Clarke & Co., Toronto, Canada), was published; it was especially interesting as showing how Professor Welton's point of view was associated with the pragmatist philosophy of John Dewey. The latter's most recent work, *How we think* (Heath & Co.), appeared in 1910, and is helping us much in Manchester.

Then, last year, we had contributions from three Departments of Education, all treating, *inter alia*, of Method. From Sheffield, Green & Birchenough's *Primer of Teaching Practice* (Longmans); from the Teachers' College, New York, Strayer's *Briefer Course in the Teaching Process* (Macmillan's), and from Manchester we issued *Outlines of Education Courses* (Man. Univ. Press). Certainly an abundance of material for criticism!

But I do not propose to handle these books in detail. I would prefer to raise two or three definite points and hear what others who may come after me have to say about them.

1. To define the scope of Method. I do not think there is much dispute in the use of this term by teachers. Welton has a chapter on the Material of Instruction, followed by one on "the Form"; in the latter he discusses General Method. In other words, Method includes all that the teacher has to consider in preparing his lessons when "a piece of teaching" (Welton, p. 20) has been allotted to him. True, there is a certain amount of overlapping between Material and Method. This is one of the difficulties that constantly recur with my colleagues and students when we discuss a Demonstration or Open Lesson; theoretically we can draw a boundary line between Curriculum and Method, but practically a discussion of one of these involves the other. As a rule I find that the interest of the best students always tends to be diverted from Method to Curriculum; and from the scanty interest paid by teachers, after Training College days, to Method, one must suppose that this tendency is general. Nor is the tendency without excuse, for until you are clear as to subject-matter, until you are fairly satisfied that the employment you offer to your scholars is worth their while, you cannot with any satisfaction sit down to make preparations, i.e., Notes of Lessons based on principles of Method. In our Training Departments there is another difficulty: the discussion or criticism classes which we conduct with students are commonly the sequel to attendance for a single period where we have witnessed a lesson given to a class of scholars. Now under such conditions it is difficult to review the Method as a whole; what happens in the single period can seldom be more than a fragment of a large experience. Then the "circle" lesson in Green & Birchenough (pp. 180-187) would only occupy some twenty minutes (?), and I, at any rate, cannot judge fairly

of its worth without hearing more as to what preceded this "development lesson" and what will follow it. Again, there are some "trainers" who, more or less avowedly, deny the value of Method. They do not of course dispute in a general way the value of psychology as an aid to teaching, but, as a matter of fact, they have never themselves tried to construct full Notes of Lessons for their own work in a school, and they advocate "freedom," "personality," "inspiration of the moment" as safer guides. There are not a few who distrust the publication of detailed Notes, such as we find in Green & Birchenough, or in Strayer, for fear that half-baked students should copy these instead of acting on their own initiative. To me such views are merely a restatement of old and threadbare controversies—in every sphere of life there should be "freedom, variety, and elasticity," as the Master of Trinity sonorously pleaded on a celebrated occasion. But our special task is to search for rule and law: there will be plenty of freedom left when we have analysed, with greater success than we can claim at present, the processes that govern our scholars in the affairs of the classroom. Students have a right to know from us how we diagnose what goes on; we can scarcely help them with effect without making detailed records and submitting these for discussion. No doubt when reduced to paper such records lose something of their quality, but reporting has its value in all human affairs.

2. We need to distinguish, I think, between the large and broad principles of Method based on the modes by which experience grows, and those smaller, although quite important, matters which I (or somebody else) have called Devices of Method; the use of the blackboard is an example of such. I merely mention this distinction and pass on.

3. As I examine the books mentioned above, the line of inquiry in recent years seems to be taking a fairly clear trend in an attempt to differentiate a series of "*types*" *of teaching*. In the '90's we were presented, in the orthodox Herbartian scheme, with a plan which claimed to be universal in its reach. For a time it appeared as if all Training College Method could be regulated by the five-step machinery. Some of us at a very early day protested against the narrowness of this rule, and the books above referred to show that the influence of Herbart‡ in this field is much diminished.

We are now disposed, I say, to search for typical modes of learning. The student is presented with a characteristic *type*—a lesson, say in Expression, or in Induction; he witnesses and examines several pieces of work conforming to this type; he perhaps prepares lessons in accordance with it. This mode of approach has great advantages for Training College classes; it indicates a close relationship between psychology and the classroom; it gives the student a definite prescription to which he can work. Anyone who reads, e.g., Green and

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‡ I should rather say of Ziller and his school, for Herbart himself was not so pedantic.

Birchenough will see the value of the plan; although the authors, writing for junior students, disclaim pretensions to psychological theory, it is evident that the work is based throughout on a study of mental processes.

4. If this fairly represents the direction of current investigation by teachers of Method, I should like to propose one or two questions by way of introduction to this symposium.

a. Is there general agreement that such a series of types should be expounded; and if so, can we group this series of types on any large principle? I have hazarded a suggestion ("Outline of Education Courses," p. 137) for which I hope there is some support in Welton's Chapter III. I think that we may regard the scholar in his successive stages of development as displaying different modes of mental activity, or ways of acquiring experience. Each of the "types" seems to me to correspond to one of these modes.

b. Do we not incur the danger which the earlier Herbartian scheme illustrated, of devising modes of "teaching" which correspond rather to adult than to non-adult methods of learning? Dewey somewhere expresses the opinion that the Herbartian pedagogy was a "schoolmaster's pedagogy," and failed to interpret the actual life of a child; it may fairly be retorted by Dewey's opponents that he offers only a pragmatist's pedagogy! We cannot, try as we may, wholly divorce our philosophy of life from our study of Method, but the attempt is well worth making. And if we make the attempt, may we not come to regard the problem from a different angle? We should cease to regard "teaching" as something to be achieved by a "teacher" who analyses subject matter under typical forms which characterize adult mentality instead of child mentality: rather we should stand aside and watch the boy or girl at *their* pursuits (in school and out of school as well). We set aside our prepossessions as to cause and effect in mental life and record the behaviour of these young folk: we then begin the process of analysis and inquire whether we can fairly distinguish typical modes of procedure which we can expect to see repeated hereafter when other boys and girls are confronted with similar situations.

I raise these two questions which seem to me of central importance in advancing our theory of method: but those who write after me may perhaps consider that other aspects of the inquiry are more worthy of attention.

J. J. FINDLAY.

THE "PROBLEM METHOD" IN THE HISTORY COURSES OF THE ELEMENTARY SCHOOL.

By FRANCES COLLIE, M.A.,
Lecturer in Education, University of Liverpool.

There have been significant reforms in the teaching of History in Secondary Schools during the last few years, and we may reasonably hope that we no longer deserve the somewhat severe strictures passed upon our methods of instruction by the American Committee of Seven in 1897.*

The conditions in the Elementary Schools, however, still present many formidable difficulties, which are largely responsible for the lack of similar reforms in their historical work. The large classes, the impossibility of providing suitable textbooks for individual pupils, the absence of homework, and the fact that the subject is generally left to the teacher of the standard, however little knowledge of History he may possess, and however little interest he may feel for it—are all grave obstacles in the way of far-reaching changes. The result is in most cases a series of more or less dull narrative lessons on the outlines of English History reproduced orally or on paper by an indifferent class, who instead of acquiring those estimable moral, æsthetic and intellectual virtues which codes and educational textbooks assure us are the inevitable consequences of introducing History into the curriculum, are apt to derive a permanent dislike for the subject.

The question naturally arises to one's mind, "Can nothing be done in spite of the existing difficulties to make the study of History in our Elementary Schools more profitable?" There are few subjects in the Code which demand independent work and critical thought from the individual child. Now that Formal Grammar is becoming extinct there is perhaps nothing excepting Arithmetic in the Council Schools to correspond to the intellectual effort involved in translating a French exercise or producing a Latin prose which are the daily tasks of the pupils in a Secondary School.

In all narrative and descriptive lessons, however skilful and enthusiastic the teacher may be, it is impossible for him to ensure that each of his pupils is following him, or indeed taking any part in the lesson at all. Paucity of time compels him to leave the answering of questions to the small group of bright children which is found in every class, while the residue, if the discipline be strict, assumes an attitude of simulated attention which may in reality be nothing more than a state of sodden stupor.

The students in our Training Colleges talk and write *ad nauseam* of the importance of "cultivating the self-activity of the child." They will reproduce in their examination papers with unfailing emphasis the substance of such remarks as the following from Professor Welton's "Psychology of Education":—

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* "The Study of History in Schools." Report to the American Historical Association by the Committee of Seven.

"Instruction fulfils its true task only when its pupils grow in real intelligence; that is both in the desire and in the power to solve increasingly-difficult problems of conduct and of knowledge."

"Instruction which does not develop intelligence must in one way or another hinder its growth simply because the school occupies so much of the child's time and determines so largely the mental habits he forms."

"All teaching which does not stimulate real and careful thinking makes for stupidity."

Yet these same students whose tongues and pens are so ready with pedagogical platitudes leave college to swell the ranks of those who follow the line of least resistance, finding it easier to teach their pupils facts than to train their intelligence, and satisfied if they obtain memory work from a small proportion of the class and a respectful silence from the rest.

Mr. M. W. Keatinge, in his recent book, "Studies in the Teaching of History," has made an admirable case for the advisability of raising History to the level of other subjects in the Secondary School by making the period devoted to it one of serious effort and real mental training. The problems and exercises which he suggests are not to supersede the History lesson, nor is the textbook to be discarded. In Secondary Schools a good deal of work of this kind is actually being done, but the Elementary School masters still remain sceptical. They argue that the apparatus required (books of extracts) is too expensive, and that the reasoning powers of Elementary School children are not sufficiently developed for such exercises. Neither of these objections is, in reality, very serious. Much can be done with a re-duplicating machine such as every school possesses, and a book of extracts for the teacher, while the reasoning involved in answering questions of this type is not greater than is required for dealing with many arithmetical problems; moreover it is interesting and real in a sense which most of the problems current in the school are not, even though they are commonly called "concrete." However, since practical results are more convincing than the most plausible arguments, I have been trying to investigate how far it is possible and profitable to introduce such exercises into an ordinary elementary school.

It is obvious that in making a selection of extracts for such an experiment those should be chosen which are short enough to be copied on an ordinary school metograph; they should represent different types of problems, and without being too difficult for the child's comprehension, or too remote from his interests, should deal with some topic of historical importance with which the class is already familiar. The correction of such exercises is a very minor matter, and is by no means an additional burden upon the teacher, since an answer to a problem which involves a great deal of thought can generally be stated in a few words, and the child soon realizes the futility of "padding."

A class of about thirty children, taken from the Seventh Standard of a mixed school (Sefton Park Council School, Liverpool), was kindly handed over to me for one period weekly. I was not able to be present at their other History lessons, and was merely informed that they were studying the early nineteenth century.

In addition to testing the children's capacities for such exercises, the experiment aimed at investigating how far such problems stimulated their curiosity, and they were invited to ask questions on the subject matter of the problem at the end of their papers. In an introductory lesson an attempt was made to give the children some idea of the difficulties of estimating a man's character, and also of letting them realize that both narrative accounts and other evidences vary in reliability. The character of an imaginary boy was discussed. The class suggested that his mother would say he was a "good lad, steady, honest, willing," &c. His small brother might describe him as a "swank, a bully, and a tease," while his chum and his rival would respectively praise and condemn him, the result being four absolutely divergent testimonies. From this the class arrived at the conclusion that it is not an easy matter to gauge a man's true nature since he shows himself in different lights to different people, some of whom may be prejudiced against him.

Further, the class declared that of three accounts written upon the Turco-Italian war by an Italian, a Turk, and an Englishman, the last would probably be the most reliable because it was the work of a neutral spectator, and that for an impartial criticism of the Insurance Bill a man must read neither a Liberal nor a Conservative paper but the Bill itself.

Some oral work was done on a ballad so that the children might be familiar with the method, and in a subsequent lesson each member of the class was given a copy of the following extract from the *Times* of July 25th, 1815, and asked—

(1) To suggest the source from which it was taken.

(2) To say about when the article was written.

(3) If they thought it a just criticism.

(4) To write a reply by Napoleon defending himself against these accusations.

> "Our paper of this day will satisfy the sceptics, for such there were beginning to be, as to the capture of that bloody miscreant, who has so long tortured Europe, NAPOLEON BUONAPARTE. Savages are always found to unite the greatest degree of cunning to the most ferocious part of their nature. The cruelty of this person is written in characters of blood in almost every country in Europe, and in the contiguous angles of Africa and Asia which he visited; and nothing can more strongly evince the universal conviction of his low, perfidious craft, than the opinion, which was beginning to get abroad, that, even after his capture had been officially announced both in France and England, he might yet have found means to escape.
>
> "However, all doubts upon this point are at an end, by his arrival off the British coast, and, if he be not now placed beyond the possibility of again outraging the peace of Europe, England will certainly never again deserve to have heroes such as those who have fought and bled at Waterloo, for this his present overthrow. The lives of brave men who fell on that memorable day

> will have been absolutely thrown away by a thoughtless country, the grand object obtained by their valour will have been frustrated, and we shall do little less than insult over their remains, almost before they have ceased to bleed. But Fortune, seconding their undaunted efforts, has put it in our power to do far otherwise.

The replies were very unequal. In answer to (1) eight out of twenty-two wrote "From a newspaper," six quoting "our paper of this day." The remainder were divided between "the History-book" and "someone who hated Napoleon."

(2) The best answers said "A few days after the battle of Waterloo, because in speaking of the soldiers who fought there it says before they have ceased to bleed." Others referred to "his arrival off the British coast," and "the capture of that bloody miscreant."

(3) The majority (13) did not think it a just criticism, and objected to Napoleon being called cruel and perfidious, the boys contending that he was a patriot or merely an ambitious conqueror, and that his soldiers loved him and endured hardships willingly for his sake. The girls mostly thought it was a very one-sided view, obviously written by an enemy, or cautiously replied he was "not that bad." One boy, feeling, doubtless, that time tempers harsh judgments, added that "an Englishman of nowadays would not criticize Napoleon so heavily.

The replies from Napoleon were mostly poor, some resembling in style the aggrieved ratepayers' letters to the halfpenny Press, but several made a good attempt. The following are, perhaps, the best, all written by boys:—

> (1) GENTLEMEN,
>
> I am in your power, but I consider you are too hard on me. I did what many have done and many will do—try to satisfy my ambition. I was born a fighter and commander of men, and you cannot fight and wage war without having an opponent. Britons are brave men I know from experience, and I hope you will respect a brave man. NAPOLEON.
>
> (2) It is not low and perfidious to try and escape. Would any Englishman with all his valour have stayed in exile on Elba after conquering the countries I did? And as for the lives of "the brave Englishmen" who fell at Walerloo, were there not also brave Frenchmen? You speak of my cunning, and yet you English have a saying, "All's fair in love and war!"

Another boy writes:—

> This accusation is perfectly outrageous. Every general who takes war into his neighbour's country cannot possibly help harming someone. Not only that, but S'death!! there's not one good point in the whole lot of rubbish. I can guarantee that if I belonged to the writer's nationality this paper would never have been printed. But still I don't mind, it's only jealousy!

The questions raised by the children were few: none came from the girls. One boy asked (1) "Why did they not have Napoleon killed?" (2) "Did the countries against which he waged war ask for any compensation?" Another asked, "When did he massacre any people?" A third inquired, "If he was cruel, why did his men always be ready to fight for him, or help his escape like they did when he was first captured?" And a fourth asked me privately if I thought that Napoleon had been sent as a champion of the Protestant faith, as he had heard that whenever he waged war against a Catholic country he always won.

(To be continued.)

BILINGUAL STUDIES.

By WINIFRED HINDSHAW, M.A., The Training College, Swansea.

THE following studies were suggested by the chapter on Speech in Schulze's "Aus der Werkstatt der experimentellen Psychologie und Pädagogik," of which a very interesting account was given in the Training College Record (March, 1910, No. 4.) The section on Speech in this practical and illuminating work consists of four parts—Analysis of Speech Sounds, Speech Melody, Statistics concerned with vocabularies and association times, and Speech as a mode of *Expression.* The last section is the most obviously interesting, dealing largely with the importance of dramatic activity as supplementing and vivifying children's —and adults'—oral speech.

Fascinating as are the accounts of the *Kehltonschreiber* (Throat-tone writer) devised by Krueger and Wirth for recording the vibration forms of the different vowels and consonants, and Marbe's *Russringe* indicating rise or fall in the "speech-melody" by variations in extent, it must be admitted that the Training College student will not, as a rule, be able to analyze and improve articulation and intonation through the actual use of such apparatus. The rougher approximations to this kind of analysis are familiar in the common practice of representing different dialects in the standard phonetic transcript, and in attempting to render oral sentences according to the "intonation curves" of Mr. D. Jones's Study (Leipzig, 1909). Clearly, in a Bilingual College, or in a college where the students are drawn from different districts, there is the strongest stimulus to this line of observation.

Since, however, the study of Bilingualism in this country is only at its beginning, the reader may find Schulze's third section most suggestive for immediate use.

A Bilingual College is, of course, only approximately bilingual. In a Welsh Training College like Swansea there are students who use both Welsh and English readily and intelligently, students who laboriously write in one language while thinking or speaking for preference in the other, students who have largely lost their Welsh and acquired a meagre and slovenly English, and English students proper whose knowledge of Welsh means nowadays a polite recognition of the language. The difficulties in teaching such miscellaneous material are apparent. On the other hand its complexity invites comparative inquiries. It is scarcely possible to study students' vocabularies by mere enumeration, as in the case of young children. Association tests, however, are a useful aid in determining variety and readiness of vocabulary. Schulze cites the Association Studies of Menzerath giving the reaction-times for associations between noun and adjective, noun and verb, &c., and an interesting line of research is indicated, viz., a *comparative* study of reaction-times, according as the associations belong to standard German or dialect, i.e., to school or home language. It is observed that alterations in the former as regards speed of association should vary concurrently with the latter, if school work is to enter vitally into the child's mind.

The question proposed to a class of fifty-five students was: which language, Welsh or English, is used most readily in certain simple directions? Papers were distributed, giving sixty English nouns, spaces being left for suitable adjectives. In two minutes time was called, the very quickest members of the class being just able to complete the paper. A second series of nouns was then given, requiring appropriate verbs. The counting was done later by a few picked students, and the papers of the Welsh students were specially examined; these showed, as compared with the rest of the class, a slight superiority in the number of adjectives, and a slight inferiority in the verbs.

The Welsh class was then tested separately, *Welsh* nouns being used. The results showed that in this elementary respect Welsh is used much more slowly. The students themselves suggested that *writing* words in English comes more naturally, though oral association might be rapider in Welsh.

A small subsidiary test was given on similar lines to five students who know French fairly well, this test being intended to emphasize to the whole class the greater slowness of thinking of the right word in a foreign language, and intended at first—though unnecessarily—to explain the expected inferiority of the Welsh students' English results.

Variety of vocabulary was investigated by the familiar association test requiring as many words as possible expressing ideas suggested by the given terms. (Nouns, adjectives, and sometimes phrases, are given as a rule.) Here, in English, the English girls' average number of associations in two minutes was very slightly superior to that of the Welsh students, while the latter, using Welsh, on one occasion exceeded, and on another fell below, their English result.

The small French class, used again for comparison purposes, showed their fluency by surpassing both Welsh and English groups, being ambitious to show the advantage of learning languages! On another occasion the most *appropriate* adjective was asked for.

The tests have been recently repeated with a view to greater care and accuracy. For instance, Welsh and English words, if results are to be at all commensurable, should satisfy Menzerath's criterion of "readiness" or "fluency" for association purposes to a fairly similar extent, and their range of association should be considered. Again, when Welsh *nouns* are given, the appropriate adjective may require initial mutation for gender, or the verb suggest inflexion; and the Welsh students may thus lose time. On the second occasion, then, suitable adjectives and verbs were *given*, and the nouns asked for.

Selecting from the students' papers the twenty "ready" or "fluent" associations in most cases, we arranged papers for two classes in Boys' Schools—St. V in a purely English-speaking school, and St. VI in a school where Welsh is taught, and where most of the boys (especially in this class) use Welsh to some extent at home.

The results for the students and the boys respectively are appended.

This time a short test was added on range of vocabulary. The Welsh students wrote as many English psychological terms as they could think of; they then tried turning these into Welsh (of course a difficult task), and finally made suggestions as to vocabularies *really* familiar in Welsh, choosing "words used in hymns" as the best. Figures cannot represent the ease and interest with which the students made this final list, compared with the tolerant respect granted to "memory," "attention," "reflex-action," and their like.

The boys were asked to give in English "words used in games." The Welsh boys found that they know very few words for games in Welsh, though some of them gave a slightly "Welsh" turn to English words. There was not time to arrive at their best Welsh vocabulary; but the boys themselves remarked that they knew plenty of words "about the country," "about horses," and "pethan yn y ty" (things in the house) as one eagerly offered.

It should be added that both sets of tests bring out the point that to these young people Welsh is most naturally oral; the boys wanted to say their Welsh nouns alone to a far greater extent than in English. It was found in the students' case that, when they read out the words to one another and received *oral* replies, there was 75% gain in the Welsh as compared with 50% in the English result. The fact is amply borne out by the much greater vivacity and ease of manner with which the Welsh student gives a lesson in Welsh, even when her English teaching shows a very fair command of vocabulary.

These inquiries only touch the fringe of the matter, but, as far as they go, they call attention to useful points. It is not from lack of English words that the bilingual pupil suffers. These come readily enough. Style, idiom, construction, are what demand closer study. But apart from style the home language, though probably of narrower application, in a sense strikes in deeper. The emotional associations belong to it. And the teacher gains a certain insight into strata of personality reached by words with more than common power, because they belong to the language in which the people sing and pray.

TESTS (Second Series). (2 minutes time.)	English Students (34 in class).		Welsh Students (16 in class).		English Boys (31 in class).		Welsh Boys (38 in class).	
	Average.	Av. Error.	Average.	Av. Error.	Average.	Av. Error.	Average.	Av. Error.
1. Adjective and Noun (Eng.)	40	5	37	4·8	17 (almost)	3	17	3
2. Verb and Noun (English)	32	6	30·5	4·7	12	4·3	14·5	4·4
3. Adjective and Noun (Welsh)	—	—	23·5	3·5	—	—	11·6	3·6
4. Verb and Noun (Welsh) ...	—	—	26·5	5·5	—	—	11	3·9
5. Special Vocabulary—								
(*a*) English terms	—	—	13	4	9·3	2·7	9·4	2·8
(*b*) English into Welsh...	—	—	6	2	—	—	2·6	1·1
(*c*) Welsh terms	—	—	24	3·5				

N.B.—The correlation between the students' Welsh and English lists is only ·1; but between the boys' lists, ·41. The general teaching in the boys' class is much more strictly bilingual.

METHODS OF TEACHING READING.

A Comparison of Results.

By EDMUND J. GILL, B.Sc., University of Sheffield.

THE teaching of reading in modern schools proceeds upon such varied lines that it has been considered desirable to make some comparison of the results of different teaching methods, and, if possible, to justify one or another. Every method has, of course, its enthusiastic supporters, in whose capable hands the desired result has been achieved. Whether one method accomplishes this more rapidly than another, it is the object of these investigations to determine.

The procedure adopted was as follows :—Two paragraphs of equal length were selected from a reading book used in the upper classes of an infants' school. These were printed separately on cardboard, in type similar to that used in the book from which the extracts were made, but without punctuation or spacing (see below). In one case (B) the initial letters of nouns were printed in capitals.

atlastthekingsmancametothehouseof
thetwosisterstheytriedashardastheycould
togettheirlargefeetintotheglassslipper

WhenshecametothePalacetheKings
SonwasattheDoorreadytotakehertothe
BallroomTheFairymusthavetoldhimshe
wascoming

Three groups of children were taken from three different schools. I took the children individually, and after explaining to them that the spaces between the words were omitted I asked them to read the pieces aloud as they did from their books in the class-room. The first group (X), whose average age was six-and-a-half years, had been learning to read for two years; they had been taught on the method invented by Miss Dale, with some slight modifications. The children of the second group (Y), too, had been taught on a phonic method, but the forms of the letters had been made attractive to the children by ingenious, but irrelevant, associations. They also had been learning to read for two years, their average age being seven years two months. In the third school, what the Head Mistress likes to call the "Thought Method," or the "Sentence" method has been in use for several years. The children, that is to say, learn to recognize the visual wholes of words in meaningful groups, just because they are to them meaningful, in the same way as they learn to recognize spoken words in infancy. The children had been reading for only sixteen months; their average age was seven years three months. In this case, however, two boys were each nearly eighteen months older than the other children in the class. They raised the average age and increased the average times. They were the only two whose time of reading exceeded one minute.

Unknown to the readers, the time taken to read each extract was taken by means of a stop-watch. A comparison of the longest and shortest reading times, the class average and the mean variation in minutes and seconds is given in the following table, for each class and for each of the extracts:—

	Longest Time.				Shortest Time.				Class Average Time.				Mean Variation.			
Extract ...	A		B		A		B		A		B		A		B	
	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.
School X ...	3	33⅖	3	55	0	42⅘	0	47	1	49	1	46⅗	0	53⅕	0	49⅕
,, Y ...	2	18⅗	3	20	0	40	0	29⅖	1	28⅘	1	42⅕	0	29⅖	0	39⅖
,, Z ...	1	25⅕	1	25⅕	0	14	0	14	0	37⅕	0	35⅗	0	12⅖	0	13⅕

Despite the warning given, there was a tendency amongst the children of X and Y to read the printing as a whole word, the separate words not being at first recognized. The same children relied very largely upon the phonic values of individual letters in case of difficulty, though at Y this was more concealed, as sounding aloud was not encouraged during class reading. At Z, only two children made any attempt to sound letters; they were gradually teaching themselves the sounds of separate letters as the outcome of their reading experience.

Extract B was considered by a majority of the children to be the easier of the two. None of the children at X could give any reason for their opinion. Of those at Y, three thought A was printed more closely than B, and another pointed out the capitals in B as a reason for the "spreading-out" of the printing. Amongst the thirty-five children examined at Z, fourteen considered B the easier because the print was not so "close" as that of A; seven of these pointed out the capitals as the cause. Two children found out for themselves that the capitals in B were initial letters of words, and that for this reason those words were more easily picked out and recognized, whilst one boy, who had read most carefully, said that the capitals were at the beginning of names.

The same difficulties occurred at all the schools, the chief being the reading of "togettheir" as "together"; "musthave" was a few times read as "must thāve, "Sonwas" as "snow," and "twosisters" as "twŏsit," but these mistakes were generally corrected before proceeding.

Comparing the reading times for the three schools, a striking similarity throughout is shown at those two (X and Y) using phonic methods of teaching to read, thus suggesting the two variations of the one method to be of equal practical value. Their reading times are, however, more than double those for the children at Z, who, in fluency and intelligence of reading, also were equally superior. Further, questions which were asked to find out to what extent the extracts had been really "read," i.e., understood, served to confirm the impressions formed by a comparison of the different reading times, of the relative values of word and phonic methods.

It is also worth noting that the mean variation in the case of Z is relatively smaller than the mean variation in the other two cases. The shortness of the average time for the class is not due to a few exceptionally good pupils, but the work was very uniform always excepting the two cases already mentioned. The least uniform result was achieved in school X.

The results of the above investigations indicate the greater practical value of the sentence method of teaching to read, as compared with the phonic. In order to further justify this conclusion, a similar test was undertaken with the six best and the six worst readers in each of the standards five, six and seven of a large mixed school. The two selected extracts given below were read aloud by each child and timed. The type used was that found in the ordinary fifth standard school reader.

itisdifficulttodescribethefuryofsucha stormithadburstlikeawhirlwinduponthe shiptheseawasamereconfusedmassof brokenwaterimmensewavesweresurging onwardbuttheircurlingcrestswerecarried awaybythewindtheinstantthattheybroke intosurftheairwasadensemistofseawater shatteredintospraymingledwithrainwhile thesurfaceoftheoceanwasreducedtoathick creambeatenupbythetempestitwas impossibletoseethelargestwaves approachinguntiltheywerewithintwenty yardsoftheshipsbowssothickwastheair withmist

itwasaDogofconsiderableSizebutitwas insuchareducedConditionthatitsSkinhung looselyuponaFrameworkofBonesandits drawnFacewasasadPictureofSuffering andNeglectoccasionallytheunderJaw chatteredwithColdandMiseryasit attemptedtogaintheButchersattentionbya complainingWhinethisfriendlessDoghad probablybeenownedbysomeStrangertothe Countrywhomighthavediedbutnooneknew theAnimalneitherhaditbeenseenatthat Butchersshopbefore

The average times in minutes and seconds for the "best" and "worst" in each class, and the mean variations are given in the following table:—

	"Best."				"Worst."				Mean Variations.			
Extract	C		D		C		D		C		D	
	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.	M.	S.
Standard VII ...	1	35	1	3	2	$34\frac{4}{5}$	1	$23\frac{4}{5}$	0	$39\frac{3}{5}$	0	17
,, VI ...	1	$31\frac{4}{5}$	0	57	2	25	1	$25\frac{3}{5}$	0	$34\frac{4}{5}$	0	23
,, V ...	1	$42\frac{4}{5}$	1	$1\frac{2}{5}$	3	$2\frac{2}{5}$	1	$24\frac{4}{5}$	0	42	0	$18\frac{1}{5}$

All the readers, save two, read intelligently and correctly, voice inflexion particularly being just as natural as though punctuation marks had been there. Sometimes the reading was stopped until a word was spelt out by separate letters, or until a word not in accordance with context was similarly corrected. Of the thirty-four who had read intelligently, twenty-five considered that the presence of capital letters in extract D had made the words of which they were the initial letters stand out quite clearly from the rest of the paragraph. Four readers did not notice the capitals at all; one thought them a hindrance, as he expected to find proper names there and was disappointed; one girl noticed them only after she had finished reading; whilst the rest considered the extract easier to read than C, owing to the apparently wider print.

The children were asked to explain how words had been recognized from the seeming sense-less lines of letters. Three answered that they had put letters together to form words which would "make sense"; they could, however, unhesitatingly name words pointed to at random in the extract. The remaining children said that each word seemed to be seen distinctly amongst the surrounding letters and was recognized as a familiar form.

The most prominent feature of the test was the ease with which the extracts were read. The absence of punctuation and spacing caused the reading to lose little of its fluency or intelligence. Whole phrases were correctly and rapidly read, the only case where a mistake was consistently made and passed over being the reading of "noone" as "none," which answered correctly to the context. The evenness of the reading times for each of the classes proves that by the time the child reaches the upper standards the habit has been formed of recognizing at once whole word-forms as they occur during the process of reading. The ability to recognize quickly and accurately these same whole word-forms distinguishes the good from the poor reader, as the large differences in their reading times also indicate. In fact, the whole tendency of the investigations may be summed up in the words of the boy who said voluntarily "I had no need to look for separate words; each one seemed to stand out alone from amongst the others"; or, in the action of a girl who suddenly held out the card at arm's length, because "it made the words stand out."

That this recognition of word-wholes is not confined to practised readers is shown by the investigations in the infants' schools, where, too, familiar words were at once recognized and read when pointed to at random in the extracts. Therefore it seems that words once familiarized become signs—parts of the reader's every-day world—with names which are immediately associatively supplied at sight of the total word-form.

Professor Cattell, experimenting at Leipsic, has shown that whole words are recognized more rapidly than single, isolated letters.* This recognition of word-wholes should be aimed at in the beginnings of reading, as it is the ultimate method of the adult practised reader. Therefore, by making the word, or even the sentence, the unit from the very first, and postponing the analysis into syllables and letter sounds until a large "vocabulary" of word-forms are acquired, much time and much boredom may be spared, always provided that *reading for meaning* expresses the consciously directed effort of the children. How successfully thought-methods of teaching to read are being used in America, especially in defective centres, readers of Huey's work on the *Psychology and Pedagogy of Reading* will know. The present inquiry seems to establish its superior effectiveness.

The results confirm the views expressed by Claparède in the *Psychologie de l'Enfant, et Pédagogie Experimentale* (pp. 155-156): "The mind proceeds from the simple to the complex: the fact that the child sees the whole before perceiving the parts does not contradict this statement. For the child, the whole, not being a collection of parts, but on the contrary a block, a unity, to go from the simple to the complex is to proceed from the whole to its part.

"For the person who has grasped the mechanism of written language, the letter is undoubtedly simpler than the syllable, which is simpler than the word. But this is not the case with the child who sees written text for the first time. For him, the word or even the sentence makes a drawing, the general appearance of which engages his attention much more than the drawings of single letters, which he does not distinguish from the whole word—so it is often an advantage to teach children to read by beginning with words in place of isolated letters."

This opinion, based on psychological principles rather than on forthcoming evidence, so aptly summarizes the results of this inquiry, that no excuse is offered for quoting it, especially in view of the numerous modern methods of teaching reading, wherein the devices of colour, sound and play are all introduced as aids to letter-methods, which, as the above results show, do not give the best immediate practical results.

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*Huey: *Psychology and Pedagogy of Reading*, p. 72.

TRAINING COLLEGE ASSOCIATION.

Annual Meeting, December 20th, 1911.

THE Twentieth Annual General Meeting of the Association was held at the Westminster Palace Hotel, Victoria Street, S.W., on Dec. 20th, 1911. Mr. W. Loring, President, in the Chair.

1. The Minutes of the last Annual Meeting were read and confirmed.
2. The Report and Balance Sheet for 1911 were adopted.
3. The following elections for 1912 were declared:—

Vice-Presidents:
Miss S. Walker, Southlands College, Battersea, S.W.
Professor J. A. Green, The University, Sheffield.

Hon. Secretary and Treasurer:
Mr. H. E. Griffiths, St. John's College, Battersea, S.W.

The President for 1912, Professor J. Adams, London Day Training College, here took the Chair.

4. A hearty vote of thanks was unanimously accorded the outgoing officers, on the motion of the Rev. Preb. E. Hobson and the Rev. S. Blofeld. Mr. Loring replied.
5. The President then delivered the Presidential Address (see p. 198).
6. The Chairman of the Syllabus Committee (Mr. Loring) reported:

(i) That the Committee, which was originally identical with the Curriculum Committee, had, in view of its new duties, co-opted the following members:—Miss Allan, Mr. A. A. Davey, Canon Wesley Dennis, Prof. J. A. Green, Miss Lloyd Evans, Dr. Lowry, Miss Punnett, and Miss K. Stephenson, bringing its total number to 20.

(ii) That the Committee, after inviting (by circular) the criticisms of all Training Colleges on the existing Syllabuses, and summarizing their replies, had requested a number of specialists (of whom only a minority were members of the Committee) in the various Colleges to draft new, or amended, Syllabuses in the following subjects:—English, History, Geography, Mathematics, Principles of Education, Hygiene, and in doing so to have regard (*a*) to the necessities of the amended curriculum approved by the Association in October last; (*b*) to the above-mentioned criticisms. That the drafts received in each subject had been carefully examined, first by selected members of the Committee, and then by the Committee, who had approved (with or without amendment) 23 in all, and had caused them to be printed with a view to further consideration by the Association.

(iii) That the drafts had been considered, this morning and on the previous afternoon, by Sectional Meetings of the

Association, whose chairmen (he understood) were prepared to report upon them.

(iv) That with reference to "Special Method" and to "Arithmetic" the Committee had passed the following recommendations:—

(*a*) The Committee recommend that "Special Method" be included *in the Syllabuses of the individual subjects of the curriculum.*

(*b*) They nevertheless recommend that the *examination* in this part of each subject be taken (except in the case of Arithmetic, which—in the opinion of the Curriculum and Syllabus Committees—should be treated solely, or predominantly, from the point of view of Method) at the end of the Second Year, even if the examination in the remainder of the subject has taken place at the end of the First Year.

(*c*) They further recommend that the examination in "Special Method" at the end of the Second Year be the subject of a separate three-hour paper, a wide choice of questions being given.

The reports of the Chairmen of the Sectional Meetings, viz.: Mr. I. B. John (English), Miss Lloyd Evans (History), Miss L. Daly (Geography), Rev. R. Hudson (Mathematics), Mrs. Meredith (Principles of Education), Rev. H. Walker (Hygiene), were then received, and the following resolutions (embodying the substance of these reports) were carried:—

(i) That draft Syllabus No. 3 in Geography be not approved.

(ii) That the Syllabus Committee be requested to revise the remainder of the draft Syllabuses with due regard to the suggestions made by the Sectional Meetings; and that, subject to such revision, the drafts be transmitted to the Board of Education as samples of the kind of Syllabus which the Association think desirable.

It was further resolved:—That the Syllabus Committee be requested to prepare a scheme of Arithmetic embodying the view as to the treatment of Arithmetic expressed in their recommendation (*b*), and that, subject to this, their recommendations (*a*), (*b*) and (*c*) be approved.

7. The following resolution was proposed by Rev. Canon Dennis:—

"That the following note be appended to the Scheme of Syllabuses in English: 'As alternative to the above the Syllabus set for the Intermediate Examination of London University may be offered.'"

Serious objections being raised to this proposal, it was explained that the intention was that it should be taken as an "Advanced" Course only, by students who had already taken a "Pass" course, and that the study of "Method" should be included. It was ultimately resolved:—

"That as an alternative to the Syllabuses in English already approved by this meeting, the Syllabus set for the Intermediate Examination in Arts of the University of London should be accepted as an advanced course if coupled (*a*) with one of the Pass Courses already approved, and (*b*) with a section on "Method" to be prepared by the Syllabus Committee."

8. The Chairman of the Joint Committee (of this Association and the Teachers' Training Association) formally reported a discussion by that Committee on the "Four-Year Course."

9. A letter was read from the Board of Education inviting the Association to comment on the draft prepared by a Committee of their own Inspectors, of a revised edition of the "Suggestions to Teachers," on the teaching of English and Arithmetic.

Warm appreciation of this action on the part of the Board was expressed, and it was decided that the matter be left in the hands of the Syllabus Committee with power to act.

10. Miss C. Graveson moved:—

"That a Committee of the Association be formed, for receiving suggestions for the drawing up of College Testimonials to outgoing students, to submit to the next Annual Meeting." The motion was not carried.

11. A discussion ensued on the work of the Student-Teacher Year, in which Canon Dennis, Miss Luard, Miss Allan, Rev. R. Hudson, Rev. E. Hammonds, took part, and the following resolution was passed:—

"That in view of the unsystematic and unsatisfactory nature, in many cases, of the work of the Student-Teacher Year, the Committee shall carefully consider the matter and communicate with the Board as to the need of careful instruction during the Student-Teacher period, especially in the subjects essential to the preparation for the work of a teacher."

12. It was decided to make the following addition to Rule 7 (Committee):—"That it be at the discretion of the Committee of the Association to co-opt, as a member of the Committee during his term of office, the Chairman of a Section or Local Branch of the Association."

13. It was resolved that the Association express its readiness to take part in the proposed "Conference Week" of Educational Associations, so far as next year's meetings are concerned, if a satisfactory scheme can be worked out.

14. A hearty vote of thanks to all those who had undertaken the arrangements for the Meeting was unanimously passed, and the proceedings closed.

An adjournment was made from 4 to 4.30 for tea, which was served in an adjoining room.

REVIEWS.

"The Educational Theory of Jean Jacques Rousseau," by William Boyd, M.A., B.Sc., D.Phil.; Lecturer in Education in the University of Glasgow; (xii+368 p.p.), Longmans, Green & Co. Price 5s.

As we do not find ourselves in very close agreement with Dr. Boyd's estimate of Rousseau's theories, and as we propose to deal primarily with the latter, let us say once and for all, that we regard Dr. Boyd's book as a very able presentment of his case, and one which should be pondered by every student of the history of education. It is serious, clear, based on careful study of his author, and throughout suggestive.

Dr. Boyd gives his readers fair warning in his preface that his book is the pleading of an advocate, not the calm summing-up of a judge. He neither desires nor claims to be neutral; he starts from the ground of "faith in the essential nobility of the man and in the greatness of his thought." Now it does not seem to us either necessary or desirable that a personal judgment of Rousseau should enter into consideration of his works. True, those works reflect himself intimately, But it is the works we should judge, without considering whether what we praise or condemn found a place in the life of the author. That Rousseau's impassioned language on the duties of parents accords but ill with his own conduct, matters not at all to the value of his plea. And it is his plea we are concerned with when estimating him as a teacher. The brief and very fragmentary biographical sketch in Dr. Boyd's earlier chapters would, therefore, in our opinion, have been better omitted. It involves much *suppressio veri* to bring it into harmony with the presupposed "nobility" of Rousseau, and it has no bearing on the truth or falsity of his theories or on their relation to the thought and conditions of his time.

In the discussion of Rousseau's doctrines, Dr. Boyd, holding fast to his faith in the greatness of his master's thought, regards Rousseau as a philosophic thinker, and makes strenuous efforts so to re-state—or rather, in many cases, develop—Rousseau's ideas as to make them consistent. This is done with much ability, but even Dr. Boyd cannot reconcile the irreconcilable. Rousseau, indeed, was essentially not a philosophic thinker, but a rhetorician—a man of morbid sensibility, not of abnormal power of intellect. To his writings may be applied his own criticism of the educators of his day: "Without being able to distinguish truth from error, they have the art of confusing others by specious arguments" (*quoted* p. 63). There is much force in the following remarks from the *Censure de la Faculté de Théologie de Paris contre le livre...Emile*: "He usually pushes his imagined proofs as far as he can, bringing to bear everything that he believes likely to make an impression on his readers. But while he is thus entirely occupied with one topic he pays no attention to what he has said in connexion with others." It is quite gratuitous to assume, with Dr. Boyd, (p. 121) that in the *Emile*, for instance, Rousseau had principles quite different from those of the earlier *Discourses*—which Rousseau himself tells us are "inseparable" from the *Emile*—and that passages incompatible with those new principles are unconscious backslidings into earlier and cruder theories. Indeed, Dr. Boyd grants that Rousseau "himself never realized the fundamental change that had taken place in his thought" (p. 122).

With this aim at the reconciliation of contradictories Dr. Boyd struggles valiantly to harmonize the individualistic education of the *Emile* and the nationalistic education of the *Considérations sur le Gouvernement de Pologne*. He does not seem himself to have altogether escaped the contagion of inconsistency. "So long as Rousseau is engaged with the problem of the *Emile* . . . there is no possibility of reconciling self-interest with the common good" (pp. 175-176). Yet "the reconciliation of nature and society is certainly effected in the person of *Emile*" (p. 190). It is not, we think, that "for Rousseau the difference between the two ideals is largely a matter of emphasis" (p. 235), but that now one and now the other stream of ideas most readily reacted to the topic with which he was at the moment dealing.

Similarly, the family education of *La Nouvelle Héloïse* and the education of the *Emile* must be reconciled by the rather violent assumption that the latter was family education in disguise, though it has also to be granted that in neither case has Rousseau shown any true conception of the educative function of the family (pp. 337-338).

Dr. Boyd holds Rousseau's picture of the development of *Emile* to be "beyond all comparison the most profound and suggestive of its kind in the whole literature of pedagogy" (p. 250). Yet he finds it necessary to criticize it in a way which removes its most essential and distinctive feature—the disparateness of the successive stages (pp. 328-333). He explains Rousseau's "over-demarcation" of the different periods of life as an "exaggeration consequent on his reaction against the view commonly taken of the child" (p. 332). Probably; but the question is not whether Rousseau can be excused for what he wrote, but whether what he wrote was true. And by his own re-statement of the course of development Dr. Boyd shows that it was not true (pp. 333-334).

Yet Dr. Boyd speaks of Emile as "a genuine boy" (p. 13), though in the note on p. 70 he grants that he "is virtually an automaton in conduct." At maturity Emile is a citizen, (p. 233) though apparently of nowhere, for in the modern world "all that really constitutes nationality is wanting" (p. 219). Indeed, Emile professes himself as unbound by ties of fatherland as by those of family. Dr. Boyd does not show us the product of Rousseau's system as painted in the *Emile*—the creature entirely devoid of self-control, begging his tutor to protect him from himself—and he says not a word of the further development as set forth in the unfinished but very suggestive *Emile et Sophie*.

The most serious omission in Dr. Boyd's book seems to us to be that he never discusses what ideal of life underlies and permeates Rousseau's doctrines—what is the kind of character an adherence to his principles would tend to produce. "Life is the business for which I wish to prepare him," says Rousseau (p. 230). It is, therefore, essential to realize Rousseau's conception of the ideal life. "The only passion natural to man is self-love" (p. 168), is the real key-note of his ethics as of that of his contemporaries of the 'Enlightenment.' We do not share Dr. Boyd's surprise at finding the "gross conception of human bliss" quoted on p. 194, in Rousseau's later writings. It is in harmony with the many passages in the *Emile* which reject the slightest sacrifice of the ease of the present to a possible good in the future. That, indeed, is the essence of the teaching of Rousseau, and it is because it is so that many now, as in the past, agree with Dr. Parr that "the tendency upon the whole is very pernicious."

Dr. Boyd, in the concluding chapter, too readily attributes to Rousseau the *origination* of the truths embedded in his paradoxes. He actually says that Rousseau "was the first to call attention" to children's innate impulses (p. 317). Rousseau certainly did call attention to them, but no one who casts his thoughts back over the long series of his predecessors can seriously claim that it was only in the year of grace 1762 that mankind first heard that children grew in mind as well as in stature, and that the seeds of both aspects of growth were within themselves. Rousseau voiced the discontent and the aspirations of his time, and his very paradoxes and exaggerations drew an attention to his writings they would otherwise not have attracted. That he did stir men, and that mightily, is incontestable. But now few persons read him. His influence is rather through certain of his ideas that have passed into the general mental atmosphere of our day. The question for us is: Are these true? Should education be stripped of authority and guidance; should the future be disregarded; should high and noble purposes find no place in life; should strenuous effort disappear; should the ideal of life be a largely negative avoiding of discomfort and a passive acceptance of ease? These questions are, unfortunately, not discussed by Dr. Boyd; yet they are the really vital elements in our inheritance from Rousseau.

J. Welton.

"Scottish Education, School and University, from Early Times to 1908."

By John Kerr, M.A., LL.D. (xvi+442 pp.). Cambridge University Press. Price 6s.

THAT within a few months of each other Dr. Kerr's general sketch and Mr. Strong's more specialized study of Scottish Secondary Education should appear fills an Englishman with envy. The history of English education has been attacked here and there, but as yet no one has given us a brief survey of the results reached, which might form an introduction to more specialized study.

To survey successfully the whole range of education, even in a country small in size and population, demands essentially the power to place clearly before the reader wide characteristics and trends of movements, and to use specific facts mainly as illustrative ; to see into the meaning of things and make that meaning clear. It is here that Dr. Kerr's book fails to satisfy us fully. It is of the style of history-writing—now unhappily so common—in which facts are massed together and nothing stands out very clearly. Nor are the facts chosen always those which make it easy to reconstruct the life of the past. As a former inspector, Dr. Kerr is naturally mainly interested in questions of external machinery. But those of us who "care for none of those things" in themselves would have preferred to have more of what was actually being done in schools and universities than Dr. Kerr gives us. Further, the writing is not always clear. Frequently the author seems to assume a knowledge in his readers which only those already familiar with Scottish affairs are likely to possesss. Moreover, such sentences as the following (p. 361) are not infrequent : "Queen Margaret College, Glasgow, had its origin in 1868 as the result of a movement for the higher education of women by Mrs. Campbell of Tulliehewan."

Dr. Kerr is most at home in recent times, and his later chapters are the most satisfactory. He is least at home in dealing with mediæval education. His prepossession is plain. The mediæval church cared for "correct life rather than intellectual development" (p.28). "Its aim was to establish orthodoxy rather than search for truth" (p.29), and so on. So, of course, just before the Reformation, "gleams of enlightenment had begun to pierce the darkness of the middle ages" (p. 49). After this it is not surprising that Dr. Kerr "can only guess what is meant by disputations" (p. 27), or that he fondly imagines that for the founding of a mediæval university "the sanction of the Pope was indispensable" (p. 31). By the few incidental allusions actually made, he shows also that he is unfamiliar with the extent to which French was taught in Scottish mediæval schools. Yet the disastrous effects of the Reformation on schools and universities stand out clearly even in Dr. Kerr, though the intolerance of Knox and his party is not made evident.

Dr. Kerr is not pedantic about consistency. The sixteenth century of p. 8 becomes the fourteenth on p. 36, that mediæval education might be shown in a darker light. On p. 52, the whole mediæval university curriculum "must be changed," yet on p. 214 we find in the eighteenth century "a general adherence to education on mediæval lines." On p. 88 we read that in the seventeenth century in Scotland "the need of physical recreative exercise as an element of school life was recognized and reasonably attended to." Yet on p. 120 we are told that "such harmless and healthy amusements as playing at ball and bathing were regarded as criminal, and were punished by whipping and expulsion." Nor would the difference between school and university discipline explain such discrepancy. So, until one reads the second passage one does not see the humour of the "recognized and reasonably attended to" of the former.

Dr. Kerr has the inspector's faith in examinations, which seem to be, in his eyes, the one and infallible means of discovering merit. He tells us with apparent satisfaction how schoolmasters were appointed in Scotland by competitive examinations (p.90). But he does not point the moral when on p. 94 he shows the outcome —numerous dismissals for inefficiency, decay of many schools, brutality of punishment, at times developing into manslaughter, if not murder. Certainly, little could reasonably be expected when "the stipends of teachers, at no times large, were, early in the seventeenth century, much reduced below a living wage" (p.103), and nothing stands out more clearly in Dr. Kerr's book than the fact that, till quite recent times, the traditional Scottish love of learning failed to take the practical form of paying adequately for it.

Dr. Kerr might in many instances have illuminated his account of things Scottish by reference to similar movements elsewhere. Thus the Scottish Academies might have been compared with those in France a century earlier, and the work of the Scottish S.P.C.K. with the contemporary efforts of its English sister.

On the training of teachers Dr. Kerr has not much to tell us. But in an Appendix there is a brief but interesting account by Dr. Morgan of the present Scottish system of co-operation between Training College and University which seems to be working so efficiently, and which we in England are watching with much interest.

We have dwelt on what seem to us to be the blemishes of Dr. Kerr's book. In such an attempt each critic will find his own blemishes, and what are blemishes to one may even be good points to another. But we do not wish it to be supposed that our general verdict is adverse. For what Dr. Kerr has given us—and he has given us much—we are grateful. J. WELTON.

"**Mental Fatigue.**" By Dr. Max Offner. Translated by G. M. Whipple (viii. + 132 pp.). Warwick & York (Baltimore, U.S.A.) 1d. 25c.

THE fact that Professor Whipple thought it worth while to translate Dr. Offner's little volume is enough to commend it to the notice of teachers who happen to be interested in Psychology. The book is written with special reference to the problems of instruction and school organization. It offers the most complete available critical account of the investigations into this subject which have followed the pioneer work of Sikorski, in 1879. Moreover, Dr. Offner is a schoolmaster, and he gives special attention to inquiries which are of a school rather than of a laboratory type. We do not expect to find ergographs in the classroom, and the æsthesiometer has a technique which teachers will not be expected to cultivate, even though the instrument gave results ten times more reliable and uniform than is actually the case, but teachers should know something of those methods of detecting fatigue which involve nothing more than the working conditions of school, and some knowledge of the way in which others have tackled the problem. The discussion of the general results so far achieved, and of the laws of fatigue, are particularly interesting and valuable. J.A.G.

"**A Practical Training in English.**" By H. A. Kellow, M.A. (272 pp.). Harrap & Co. 2/6.

WRITTEN avowedly for advanced school work, the book offers a method for the study of shorter poems, which in its place would be valuable. If, on the other hand, it were meant to occupy, shall we say, the whole attention of the pupils during the time available for English in any particular year, it would be open to serious objection. Its method is in the main analytic, and its maxim is thorough. To treat a poem at school occasionally in this way would be excellent, but it is pre-eminently not the way to make ordinary boys like poetry. Mr. Kellow does not let us into the secret of his own procedure, except that he speaks of the book as representing "a kind of casual teaching." If he means that the lessons suggested are adjuncts to his broader treatment of literature, we have nothing but praise for his book, though it would have been better to make this point clear. Lessons on the growth of the English language and literature are interspersed, connected with the poems preceding and following them. J.A.G.

"**The Elementary Course in English.**" By J. F. Hosic, Ph.M. (vii. + 150 pp.). The University of Chicago Press. 3/- net.

THIS book is of the vaguely dogmatic order of books on Method, which one had hoped were dying out. Thus, of conversation lessons to young children, we are told that "the topics should be both interesting and instructive, and each lesson should proceed to a definite end." The difficulty here is not altogether one of choice of topic. Just how to make a conversation lesson justify its name is what we want to know, and a transcript of an actual lesson or two, exactly as they happened, with critical comments, would have been really helpful. So throughout the book; there is abundant advice and assertion of what should and should not be, but we never come to grips with things as they are. We can do this for a game of chess; surely it is occasionally worth while in the equally serious classroom game! The most useful parts of the book are the bibliographies and the lists of suitable poems and stories. J.A.G.

"**Psychology and Pedagogy of Writing.**" By May E. Thompson, A.M., Ph.D. (128 pp.) Warwick & York. $1.25

About a third of the text is devoted to the Historical Development of the Alphabet, interesting enough of course, but it may be doubted whether history in this case helps the teacher face to face with the problem of teaching children to write. The remainder of the book describes the researches of those physiologists and psychologists who have helped in the analysis of the complex process of writing one's own thoughts, and discusses the pedagogic results. Here and there the writer makes statements without any apparent authority. Thus: "it has been found by investigation that left-handed children who have been made to learn to write with their right hands, never in later life reach the point where they can write with any degree of speed and ease." No reference is given to the investigator who is responsible for this sweeping statement. As a rule, however, the author is more careful, and we may commend the volume to those who would like to keep their practice abreast of scientific research. Professor Thorndike has allowed his "Scale of Handwriting" to be included—a valuable addition to the text. J.A.G.

"**Records of the Education Society. Teachers' College, Sydney, N.S.W.**" No. 10. The Teaching of Elementary Geometry. By Robert J. Middleton, M.A., Lecturer in Mathematics (pp. iv+25).

To this series of monographs from the Education Society of Teachers' College, Sydney, we extend a very cordial welcome. They are pleasing testimony to the professional enthusiasm with which Training College work is being carried on in other parts of the Empire. At the same time they are of special interest to us in showing the nature of the problems that teachers elsewhere are endeavouring to solve. To judge from the titles of the papers we are not alone in having to face the difficulties of slow promotion and backward children, while the more modern theories of teaching seem to be canvassed as keenly as in this country.

Mr. Middleton, the writer of the present paper on the Teaching of Geometry in Primary Schools, shows himself to be well acquainted with the literature of the subject. The defects in his treatment of the problem seem rather to be due to a lack of sufficiently wide psychological knowledge and first-hand acquaintance with good educational practice. His practical illustrations and suggested scheme are open to serious criticism. It is surely a mistake to say that after a boy has by geometrical methods found the height of a tree and the length of a line in the playground, that he is ready "to find distances across rivers, through mountains, along roads, and to find the heights of towers, of steeples, of mountains." C. BIRCHENOUGH.

"The Cambridge Nature Study Series. Lessons on Soil." E. J. Russell, D.Sc., Cambridge University Press, 1911 (pp. 132+xv), 1s. 6d.

This is the first of a series of Nature Study Manuals intended for children of about 12 to 14 years of age. The editor, Mr. Hugh Richardson, is to be congratulated on beginning with such a comely, well illustrated and interesting book, devoted to an aspect of nature work that, though it is of supreme importance, is commonly ignored.

It goes without saying that Dr. Russell, of Rothamsted, is a master of his subject, and few teachers will open the book without finding much that is most suggestive and stimulating. The chapters are based on lessons given by the author to village school children at Wye and to Third Form boys at Harpenden, and consist in the main of an experimental study of different kinds of soil such as children might reasonably carry out for themselves with the help of simple apparatus. As a whole the experiments are admirably conceived, and in the hands of a thoughtful teacher would prove most stimulating, for it is not necessary to make the author's mistake and assume that children know nothing whatever about such things as sand and clay. Moreover, if the teacher has caught the spirit of the last two chapters, "The soil and the country-side" and "How soil has been made," there will be no danger of the course degenerating into mere "test-tubing." He will naturally set to work out of doors, and lead his children to note the more striking influences of soil on vegetation and human conditions in the neighbourhood making use of experiment as circumstances demand. Teachers will find the Appendix a useful addition to the book.

C. BIRCHENOUGH.

"A Nature Study Guide." By W. S. Furneaux, F.R.G.S. Longmans, Green & Co. (pp. 293+xv). 3s. 6d. net.

Those of us who are acquainted with Mr. Furneaux' earlier books will naturally look with interest to anything he may write on school Nature Study. In the present work he has gathered together a wealth of material arranged in seasonal order, and interspersed it with helpful suggestions as to the best ways of dealing with the subject. The text is amply illustrated, and there are some useful chapters on school aquaria, vivaria, &c., which add considerably to the value of the book from the teacher's standpoint. The author's discussion of the educational aspects of Nature Study is, however, disappointing. His intention is excellent, but he expresses himself in a way that cannot fail to give teachers a wrong impression of the best ways of handling the subject. He has failed to analyse what such a word as observation means and what it presupposes. It is the cardinal fault of much current teaching that it fails in this respect. In view of the value of the rest of the book it is a pity that these chapters were admitted. Perhaps in a second edition it would be possible to get someone to rewrite them.

C. BIRCHENOUGH.

"Inorganic Chemistry." By S. W. Burnell, LL.B., B.Sc., and A. J. Dicks, B.A., B.Sc. London: Ralph Holland & Co., 1911 (pp. 372+iv). 3s. 6d.

This book is intended to meet the requirements of the Oxford and Cambridge Senior Local and the London University Matriculation Examinations.

So far as we have tested it the book seems to have been carefully compiled, but it is difficult to discern any new feature in the method of treatment adopted. Where the need for books of this kind arises is not easy to understand, for surely no one ever learnt real Chemistry from them. Everything is so cut and dried that thinking is at a discount. In the first half of the book a boy learns that reactions go in one direction; in the second half, that the same reactions go in two opposite directions. Surely it is time we took a more dynamical view of the subject even in the early lessons. To be satisfied with a bald statement such as

$$3Fe + 4H_20 = Fe_3\,0_4 + 4H_2$$

is to give quite a wrong point of view, and to teach something that later has to be unlearned.

C. BIRCHENOUGH.

"Educational Handwork. A complete and varied course for Schools. For Juniors." By William Taylor (xi. + 176 pp.), A. Brown & Sons. 3/6.

BEFORE adding one more book of this type to the many already on the shelves, it would be wise to consider once more what the introduction of handwork into the schools really means. Are we setting before ourselves a constantly widening-aim? Is handwork a means to an end or an end in itself? What end? Is it an essential experience of life? There are four types of workman—the labourer, the craftsman, the artist, the artist-craftsman. Which type are we producing? Which method will produce the highest type of artist-craftsman? With these questions haunting us, let us examine our educational handwork schemes again.

Mr. Taylor offers us schemes of work in paper, thin cardboard, and plasticine. The plasticine is a "scheme of modelling to measurement, to prepare the pupils for light woodwork later," and among the models suggested are letters H. F. L., a flag, and a picture frame. The question of suitability of material is a valuable consideration, a thing is fitting and *right*, in so far as it serves the purpose better than any other. "Educational Handwork" offers us, beyond this plasticine preparation for light woodwork, a paper sign post, a plasticine bath mat, and a paper water bottle.

In the series of paper models we find a square with a quarter corner cut out, called Figure 1. Figure 10 is a right-angled isosales triangle; another "two overlapping squares." More letters appear, H. L. T., &c.; an octave of a piano keyboard by itself. An inquiry into the interests of the little child for whom these are intended will make us hesitate before asking him to spend his time upon them. Some of the models suggested, trays, pockets, &c., are within his interests certainly, but there is nothing new in the designs, and no indications of scope for invention and experiment.

"If a child makes a good model in this old material (covers of exercise books) he should be allowed, as a special reward, to use 'proper materials' for the next model. This will prove an incentive to good work." There is surely no need to imduce the child to work well by holding out the advantage of "proper material!" Of course, to the little child there is no such thing as rubbish, and all is grist that comes to his mill. So long as the child realizes the *need* of the thing he is making he will work joyfully at it, giving his best loyally, and putting his whole heart into the making; but if it be only "model 7," then even the inducement of superfine material will hardly hearten him to his job. It is so difficult to be simple—the over-elaboration of handwork schemes is one of its great dangers.

WOUTRINA A. BONE.

Physiology." By Dr. W. D. Halliburton, M.D., LL.D., F.R.S., Professor of Physiology, King's College, London. J. M. Dent & Sons. 1/- net.

THE claim that physiology should be represented in such a series of primers, and take some more definite place in the education of the average person than is accorded to it at the present moment, might well be based upon the prefatory statements of the author.

> "It is a necessary qualification for good citizenship that they should know the fundamental reasons for the promulgation of wise laws in reference to hygiene or health. These laws should be based on physiological knowledge, a man or woman who really understands why fresh air, pure water, suitable diet, and muscular exercise are beneficial, is more likely to aim at getting them than those who merely have a vague sort of notion that there are such things as reasons for their belief."

Combining all the well-tried methods of an experienced teacher and writer, Dr. Halliburton has written an excellent primer that should help to serve this purpose of training for citizenship, provided the necessary recognition is extended to the subject.

J.S.M.

"A Hundred Years of History, 1216-1327," by Hilda Johnstone, M.A., (xv+ 292 pp.) Longmans, Green & Co. 5/- net.

THIS is an admirable example of the Source Book. The author has gathered together, from contemporary record and chronicle, the story of the thirteenth century, putting it into English, simple and attractive enough for students who are not ripe enough to tackle the originals for themselves. Teachers who are dealing with this period will find it an invaluable help. It should find a particularly warm welcome in Training Colleges, where History and methods of teaching it are zealously studied.

"The Trend in Higher Education." By W. R. Harper, President of the University of Chicago (ix+390 pp.). The University of Chicago Press.

A series of essays published in 1905, and dealing in the main with the democratic tendencies in higher education. President Harper has great faith in the future of the University as prophet, priest and philosopher of Democracy and, granted the freedom which he postulates, he makes an excellent case. The other essays deal with a variety of topics, including Co-education, Latin versus Science, The Theological Curriculum and Waste in Higher Education. They are for the most reprints of addresses and contributions to magazines.

"The Moral Life and Moral Work." By W. R. Sorby, Litt.D., Knightsbridge, Professor of Moral Philosophy. (Cambridge Manuals of Science and Literature). Cambridge, 1911, 8vo., pp. 147. Price 1/-.

THIS brief account of "goodness in human life" consisting in the main of a discussion of the more famous among the virtues, is an admirable example of that succinct simplicity of which Professor Sorby is a master. It needs no detailed comment. It is solid and yet intelligible to every one, and is illustrated by happily-chosen references to many kinds of literature. T.L.

BOOKS RECEIVED.

(Notice in this column does not preclude more detailed review in a later issue).

"Literature in the Elementary School,"*by P. L. MacClintock, M.A. (viii+305pp.) University of Chicago Press; 4/-; 1907.

"The Principles of Intellectual Education," by F. H. Matthews, M.A.; 138 pp.; Cambridge University Press; 2/6 net; 1908.

"Poetry and Life Series." Edited by W. H. Hudson.

Various volumes, planned to introduce young students to the poet's work in close connexion with their lives. Selected poems are introduced just at the moment when we are in sympathetic connexion with the author's condition of mind. Poetic expression is thus "made to seem most human and vital." Of course the idea is not always easy to work out, but the several volumes have been put in capable hands, the editor himself being responsible for several. His introduction to the study of Literature has already been noticed in these columns.

Shelley and his Poetry, by E. W. Edmunds; Coleridge and his Poetry, by K. E. Royds; Gray and his Poetry, by W. H. Hudson; M. Arnold and his Poetry, by F. Bickley; Milton and his Poetry, by W. H. Hudson; Keats and his Poetry, by W. H. Hudson; and other volumes. G. G. Harrap & Co.; 10d. each (limp cloth).

"Outlines of Education Courses in Manchester University." 189 pp.; The Manchester University Press. (Especially valuable for Professor Sadler's exhaustive treatment in syllabus form of the History of English Education from the broad social standpoint, from 1800 to 1911).

"An Epitome of English Grammar." 77 pp.; J. M. Dent & Sons; 10d.

'For use in Schools.' As an occasional book of reference, the book may have a value, but we should be sorry to see it in general use as a text book.

"Education for Citizenship," by Dr. G. Kerschensteiner, translated by A. J. Pressland (xx+133 pp.); G. G. Harrap & Co.; 2/6 net. (A book of first-rate importance by a great administrator.)

"The Education of Women,"* by Marion Talbot; 255 pp.; University of Chicago Press.

"Stories of the English," by F. (2 Vols. x + 178 pp., 261 pp.). Blackwood. 1/6 each.

There is a pleasant personal note about these stories which will make them very attractive to young readers.

"The Desire for Qualities." By S. M. Bligh (xii + 322 pp.). H. Frowde. 2/- net.

"Educational Needlecraft." By Margaret Swanson and Ann Macbeth (xiv + 136 pp.). Longman's, Green & Co. 4/6.

"An Introduction to Experimental Psychology." By C. S. Myers, M.D., Sc.D. (Cambridge Manuals of Science and Literature). Cambridge, 1911, 8vo., pp. vi. + 156. Price 1/-.

"Outlines of the History of German Literature." By J. S. Robertson, Professor of German in The University of London. William Blackwood & Sons, Edinburgh and London, 1911.

The Pronunciation of English; (i) Phonetics; (ii) Phonetic Transcriptions. By Daniel Jones, Lecturer on Phonetics at University College, London. Cambridge University Press, 1911.

"The Beginners' English Grammar." By F. W. Harrison and E. Harrison. xii+143 pp. Longmans, Green & Co. 1/6.

"Child Study." "Woman Teacher."

"The Woman Teacher's Magazine."

"Child Life." "School Review."

The Reviews of several important books are unavoidably held over until our next issue.

GENERAL NOTICES.

Members of the Training College Association will rejoice to know that their President for the year, Prof. J. Adams, LL.D., has been appointed to the Presidency of Section L (Education) of the British Association which meets this year in Dundee. In the last issue of the Journal the advantages of the British Association Meeting as a gathering-ground for Educational Students and Practitioners was emphasised. We hope Professor Adams' presidency will be marked by record attendances.

It is with pleasure that we note Messrs. Longmans, Green & Co.'s announcement to the effect that they will publish shortly a book on Experimental Pedagogy by Dr. Rusk. The work is to be based on Professor Meumann's *Vorlesungen*, and as Dr. Rusk has himself engaged in psycho-pedagogical research, we may hope for something more than a mere abridgment.

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* The Cambridge University Press acts as English Agent for the publications of the Chicago Press.

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A MOTOR FACTOR IN PERCEPTION AND MEMORY.

By W. H. WINCH, M.A.

I.—The General Problem Stated.

ALL teachers who are in any sense *au courant* with current educational psychology, by which I mean the psychology which is to-day an actual operative doctrine among enlightened teachers, are aware that the conative and motor sides of intellectual life have, during the last ten years or so, received a more and more respectful share of attention, both from psychologists and educationists.

Most of us now-a-days believe that education must take its start, and to a great extent its aim, from the satisfaction of conative tendencies in those who are to be educated. We believe that the co-operative mental activity of the pupil is a *sine quâ non* in any method which claims to be truly educational.

Differences of opinion emerge when we begin to discuss which, if not all, of a child's conative tendencies shall be satisfied; they emerge also when we begin to distinguish the kinds and values of various mental activities. But, allowing all possible discount for what we may call internal varieties of view, there can be no doubt that there is general agreement to lay more stress on the conative and expressive aspects of mental life.

In line with this general movement of thought there has been a more and more decided emphasis on the motor aspects of education, and it is claimed that there is a motor factor in every act of perception and memory. When, for example, we move our eyes to see, what we see partly depends upon the movements we make. But just how? For it is here that diversity of opinion begins. Are the sensations of eye-movement synthesized with the retinal sensations into complex percepts? Or do the sensations of movement contribute nothing directly to the percepts of the things which are seen? We move our eyes to see, but does the movement affect *what* we see? It is no part of my present intention to discuss these questions; I referred to them for the purpose of showing that, even among competent opinion, there was much doubt as to just how this "motor factor" worked, and for another reason which will be apparent presently.

For the educationist began to apply the psychology which laid stress on the motor side of mental life, and tended to interpret its value in terms of motor sensation. If, he argued, sensations of movement are bound up with retinal sensations in the perceptions of things, the perception may be made fuller and richer and more susceptible of remembrance if appropriate movements are made in perception (even though they are *artificial* movements) in addition to those movements which in a *natural* sense are necessary to the perception. So that in looking at a thing in order to perceive it, let the child trace its outline in the air; he can do this while he is looking at it, and thus facilitate the complex percept, compounded of motor and retinal sensations. Professor Sully, in the last and recent edition of his Handbook of Psychology for Teachers (Note on page 510), speaking of the rôle of motor experiences in the development of perception, puts the present position thus: "In the case of teaching to draw or write, this problem has assumed the form: Do the motor images (sensations), developed by experiences of the moving hand, assist in rendering the perception of the model-form more precise or vivid? A lively discussion of this point has recently been carried on by two German professors. Lay asserts that motor experience does assist, and that drawing or writing 'in the air,' before doing so on paper, promotes correct execution. Meumann vigorously denies this." Just precisely what it is that Professor Meumann denies will not, perhaps, be correctly gathered from the necessarily condensed note in which the discussion is summarized by Professor Sully. I take Professor Meumann to mean that motor sensations are not operative; not necessarily that drawing in the air does not promote correct execution. But the reader must refer to his own words*

There is still another form in which the psychological doctrine that percepts, mainly visual, are partly compounded with motor sensations, became operative in educational theory. It was argued that, as there are visual memories and auditory memories and motor memories, if we could only manage to get all these memories working together for the same percept, we should certainly have a more reliable, and probably a more enduring, memory of the thing perceived. So that if we want the child to remember letters or numbers, it is well to let him trace them in the air as well as to look at them and hear them. The Department of Child-Study and Pedagogical Investigation at Chicago took up the question and investigated the comparative accuracy of the memories compounded and uncompounded.

The conclusion was in accordance with the view that compounded memories were superior to separate ones.†

I have never been quite able to understand from the published reports of these experiments at what condition of practice the children were when they took the tests by the various methods, auditory, visual, audio-visual, &c. But if the conditions of practice were the same for the various tests, and the tests so given that practice in one method did not unfairly benefit another, there seems no doubt that compounded memories were generally superior to separate ones. The addition of the hand-motor factor did not, however, appear to increase the accuracy of the memory for figures.

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* Einführung in die Experimentelle Pädagogik, Vol II, pp. 196 and 316.

† Chicago Public Schools. Report of the Department of Child-Study and Pedagogic Investigation, 1900-1901. F. W. Smedley.

Obviously we have raised above a whole group of questions, some immediately practical, some highly theoretical and very difficult of solution. As this is a Journal facing rather towards practice than towards theory, let me give the first place to that aspect of the question which arises in practical pedagogy.

Shall children be taught to trace the outlines of their model in the air, when they are looking at it, in learning to draw or write? Shall they also trace in that way letters or script which they are attending to for purposes of memorizing? Will this motor activity improve their drawing in the first case and their memory for the words or letters in the second? On this question of fact, I propose to-day to present the results of two researches with young children. By such experiments the question of pedagogical practice can be solved, provided there is sufficient consilience of results among the various researches directed to that issue.

But there are further questions, passing beyond the range of immediate practice, which cannot be ignored.

Suppose it be true that in one way or another the child's hand-motor-activity in tracing out the outlines of his model in the air does favourably influence his subsequent drawing? Suppose that children who make these movements draw better than those who do not? By drawing here is not meant mechanical dexterity, but what teachers would call accuracy of observation. Let us suppose the question of fact to be settled. Even so, we are hardly in sight of the theoretical solution. The percepts are more accurate, but why is this? Let me refer again to Professor Sully. He puts the position thus:

"What is the exact part taken by movement in the development of the space consciousness is a point not yet determined. Psychologists like Herbert Spencer and A. Bain make motor experience the main source of the cognition of spatial relations. To-day there is a tendency to regard it as aiding in the development of the perception merely by facilitating the analytic isolating attention to the several details implicit in the primordial extensity."* Let me expand Professor Sully's note.

Is it because the sensations of the movements in the air combine with the retinal sensations from the object to give a spatial percept more impressive and enduring than one built up from visual sensations alone? Or do the motor sensations, without combination with the retinal sensations, yet, neverthless, fill the percept out, and give aspects not sensed retinally, or not sensed so well retinally, and aid perception in that way? Or do the movements aid merely by bringing the parts of the object in spatial sequence upon those parts of the retina which are most sensitive? In the words of Professor Sully quoted in the footnote, does it merely facilitate the analytic isolating attention? Or, further, may there not be another factor? Those who have to do with children are well aware that production and reproduction are of the very essence of the educative process. Let a child look at a thing and then draw it, the object being removed. The effort to draw appears to have a "back stroke" effect on the clearness of the visual percept. If this be so, drawing in the air may be, as it were, only a preliminary drawing which yields a practice effect to later ones on paper of the same object. It may be the motor *expression* and not the motor *impression* to which the improvement of the spatial percept is due.

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* Note—"Sully's Handbook of Psychology for Teachers." 1909 Edition, p. 173.

Many of these are difficult questions to solve. I referred to them for two reasons. Because, in the first place, I was anxious to prevent the educational psychologist from supposing that he had settled a difficult theoretical point when he had merely justified or successfully disputed a point in experimental pedagogy; and, in the second place, because I believe that a precise understanding of the theory of the processes involved may, by-and-by, make a difference to the educational practices themselves. It is, indeed, to that forward and backward movement, from practice to theory and from theory to practice, that I look for any real and stable advance in education. It is not because I am ready with a solution of all these questions that I have raised them. I raised them to supply, as it were, a theoretical framework in which my own experiments may find a place. To some account of these I now proceed.

II.—First Series of Experiments:

Visual versus Visual plus Hand-Motor Perception and Memory of the Outlines of Objects.

1. *The Problem of the Experiment.*

Do children who trace the outlines of an object in the air, whilst they are looking at it, perceive and remember its appearance more clearly than those who merely look at it?

2. *General Plan of the Experiment.*

Two classes of young children (76 in number) consisting of the boys and girls of the Standard I classes of a municipal infants' school, in a rather poor neighbourhood, were set to do the work. They were divided into two equal groups on the results of several tests in the Drawing of Objects, based upon visual perception. After the division had been satisfactorily effected, one of the two groups worked further tests, using visual perception alone, the other group worked the same tests after tracing the outlines of the objects in the air as well as observing them visually.

A comparison of the results in the Final Series of Tests is taken to indicate which of the two methods is pedagogically better.

3. *Chronology of the Experiment.*

(*a*). *The Preliminary Tests.*

The preliminary tests for the division of the children into two equal groups began on Tuesday, October 4th, 1910. As it was important that the same person should be in charge of the administration of the tests throughout the experiment, and there was no room large enough to accommodate the children of the two classes, it was necessary to take one of the classes at 9.45 a.m. and the other at 10.15 a.m. Two days later, on Thursday, October 6th, a second preliminary test was given. Standard Ia, which formerly worked at 9.45 a.m., now began at 10.15 a.m., and Standard Ib began at 9.45 a.m. On the following Tuesday, October 11th, Standard Ia worked their third preliminary test at 9.45 a.m., and Standard Ib worked the same test at 10.15 a.m. On the following Thursday, October 13th, the fourth and last of the preliminary tests was worked, Standard Ib working at 9.45 a.m. and Standard Ia at 10.15 a.m.

No other drawing was done in either class while these tests were being given, and it will be seen that the exercises were not unduly hurried; they followed each other at satisfactory intervals.

(*b*). *The Final Tests.*

After the children had been divided into two equal groups, on the marks obtained in the preliminary tests, arrangements were made for the two groups to take their final tests.

Group A observed the objects placed before them without tracing in the air; Group B traced their outlines in the air as well as observed them visually.

These four tests were worked on four consecutive Tuesdays, no other drawing of objects being done whilst the experiment was in progress.

On October 18th, Group A worked their exercises at 9.45 a.m.
,, ,, ,, Group B ,, ,, 10.15 ,,
,, ,, 25th, Group A ,, ,, 10.15 ,,
,, ,, ,, Group B ,, ,, 9.45 ,,
,, November 1st, Group A ,, ,, 9.45 ,,
,, ,, ,, Group B ,, ,, 10.15 ,,
,, ,, 8th, Group A ,, ,, 10.15 ,,
,, ,, ,, Group B ,, ,, 9.45 ,,

Though there was, of course, an exact time limit for observation, there was no time limit for the children's drawings, but in no case did they take more than two or three minutes.

4. *The Tests and the Method of Marking.*

(*a*). *Preliminary Tests.*

The children's drawings were done with crayon on pieces of brown paper, about ten inches square, fastened to and supported by millboards. The drawings were what are usually called "free-arm drawings," in contradistinction from ordinary drawing in which the wrist and not the elbow or shoulder is used as a pivot. I adopted this method because it is the one used in the school. I do not wish to prejudge the question as to the better method of drawing—"hand" or "arm" drawing—for children of this age.

In the first preliminary test a large flower-pot was placed before the children below their level of vision. The object was exposed for 30 seconds, during which time the children were required to look at it carefully. The flower-pot was then removed and the children were told to draw the outline from memory.

The object given for the next test was a large cup. The body of the cup was similar in shape to the flower-pot, but an additional difficulty presented itself in the handle of the cup, which was, however, rectilinear, and not, as is usual, curvilinear in shape. An exposure of 30 seconds was allowed as before, during which the children looked as before, and afterwards drew the cup from memory as well as they could. Similar procedure was adopted in the third preliminary test, in which a cylindrical canister was placed below the level of the children's eyes, and in the fourth test. On this last occasion a jug was the object to be drawn. The sides sloped inwards a little toward the top, and the jug was placed with the "lip" facing the central block of desks. The handle, which was a very small one, was turned away from the children, and very few indeed could see it at all; it was not considered, therefore, in marking the exercises.

Each child occupied the same position in the room relatively to the objects exhibited during the whole of the experiment.

The question at once arises: How are we going to mark the exercises? A drawing can be considered in several aspects. We *can* mark it for firmness and clearness of line, for dexterity in draughtsmanship. These are useful aspects in motor work, but let me say at once that no notice was taken of these aspects of the drawings. I do not wish to undervalue them, but they lie outside our present problem. We are endeavouring to determine to what extent the forms and proportions of the parts of the object have been observed, and the marking referred wholly to that issue. Fineness and steadiness of line did not count.

Ten marks were given as a maximum for each of the drawings. They were awarded by the Head Mistress and two other members of the staff, acting jointly. The marking of the flower-pot and cup gave little difficulty, and the drawing of the canister was easily judged, as the proportion of width to height was as one is to two. But in marking the drawing of the jug, though the omission of the lip was counted as an error, inaccuracies as to its position and apparent shape were not considered. The standard of marking was so "pitched" that the average mark for the first test slightly exceeded five. On the basis of the marks allotted for the four preliminary tests the children were divided into two equal groups.

(*b*). *Final Tests.*

The models used were the same as those in the preliminary tests, and they were shown in the same order, viz., flower-pot, cup, canister, jug. The time of exposure was the same, and, as before, the things were drawn from memory. But now one group looked at the object without tracing its outlines in the air, and the other group looked, and, whilst looking, traced its outlines in the air.

The final tests were marked in the same way as the preliminary tests; but care was taken that the assistant teachers, who held strong and divergent views as to the value of the "motor" element in the method which employed tracing in the air, should not know whether they were marking "visual" tests or "visual and hand-motor" tests.

(5). *Results.*

Perhaps the most satisfactory method of presenting the results is to set them forth in gross at first and in more detail afterwards. Group A—the group that was subsequently practised visually—scored an average mark of 22·9 in the four preliminary tests, with a mean variation of 5·05, whilst Group B—the group that was subsequently practised in tracing the outline as well as looking at the objects—scored an average mark of 22·9 in the four preliminary tests, with a mean variation of 5·07.

The classes were, of course, divided so that Group A and Group B should be, as far as possible, approximately equal in their work in the preliminary tests. In the final tests the two groups were found to be decidedly unlike. Group A, consisting of 38 children, scored an average mark of 24·3 (mean variation, 4·48) for the four final tests, and Group B, also consisting of 38 children, scored an average mark of 26·9 (mean variation, 4·27) in the same tests. There certainly appeared to be a difference of considerable significance, which it seemed reasonable to impute to the difference in method.

Another way, slightly more detailed, of comparing the work of the two groups is as follows:—

TABLE I, *showing the work of Groups A and B compared, test by test, in the Preliminary and Final Tests, each test being shown separately.*

	PRELIMINARY TESTS.					FINAL TESTS.			
GROUP A.	1st	2nd	3rd	4th		1st	2nd	3rd	4th
Average Mark	5·71	5·74	5·68	5·76	...	5·89	5·63	6·58	6·24
M.V.'s ...	1·5	2·2	1·9	1·9	...	1·5	2·0	1·5	1·2
GROUP B.	1st	2nd	3rd	4th		1st	2nd	3rd	4th
Average Mark	5·24	5·55	6·26	5·87	...	6·08	6·26	7·39	7·15
M.V.'s ...	1·6	2·1	1·5	2·0	...	1·7	1·8	1·3	1·0

A third way of comparing the results indicates how far, so to speak, the differences between the two groups are differences all along the line, that is how far they are common to the more and less proficient pupils. The differences in the average results, when their variabilities are taken into account, are, of course, also evidences of this; but a method which shows the groups in corresponding sections renders certain relationships more easily apparent.

TABLE II, *showing the work of Groups A and B compared, section by section, in the Preliminary and Final Tests.*

Marks for Four Preliminary Tests.	GROUP A.			GROUP B.		
	No. of Children.	Av. Mark per child per test in Four Preliminary Tests.	Av. Mark per child per test in Four Final Tests.	No. of Children.	Av. Mark per child per test in Four Preliminary Tests.	Av. Mark per child per test in Four Final Tests.
Over 30 ...	5	32·4	30·2	5	32·8	31·6
25 to 30 ...	9	27·7	27·6	9	27·7	26·9
20 to 25 ...	11	22·6	23·2	10	22·8	27·6
15 to 20 ...	8	18·4	22·1	9	18·7	27·9
Below 15 ...	5	12·6	18·8	5	12·4	19·0

It will be seen that the two highest sections have gone down somewhat from the preliminary to the final tests, but we are concerned mainly with a comparison of the work of Groups A and B in the final tests. In the highest section the average mark for the members of the B Group is decidedly higher in the final tests than that of Group A. In the second section, viz., those obtaining from 25 to 30 marks, the mark for Group B is *lower* than that for Group A. In the three remaining sections considerable improvement was shown from the preliminary to the final tests, and in all these cases a greater improvement is shown by the sections of Group B than by the corresponding sections of Group A. Taking these comparisons into consideration, together with the average marks and variabilities for the groups as wholes, it is hard to resist the conclusion that the "visual plus hand-motor" group have done better work than the group which worked visually without the aid of the hand-motor factor.

6. *Conclusions from the first Experiment.*

1. It seems clear that where children are required to perceive and draw the shapes of things, which from that point of view are relatively unknown to them, it is useful pedagogical method to instruct them to trace the outlines of the objects in the air whilst they are looking at them. It is not asserted that the conclusion holds for children other than at this age and mental level.

2. Though the result seems clear from the aspect of practical pedagogy, it is by no means clear when we turn from the practical result to ask for the psychological analysis of the operations which appear to yield the better result. Is the improved perception due to a coalescense of visual and motor sensations? Is the hand-motor factor

merely of value in directing attention visually to successive portions of the outlines of the object? Or is the motor factor merely a preliminary drawing owing its value to expression rather than to impression, whether motor or visual? I fear the evidence afforded by this experiment does not enable us to say. In this experiment improved perception and memory followed, in some way, from the presence of a hand-motor factor, and it seemed to me it might be helpful if conditions were to be found under which the presence of the hand-motor factor might be irrelevant or obstructive. To an experiment involving such conditions I now turn.

III.—Second Series of Experiments: Visual versus Visual plus Hand-Motor Perception and Memory for Unassociated Letters.

1. *The Problem of the Experiment.*

This work was carried out in the same school as the experiment just recounted, and the tests, after some preliminary preparative exercises, which I took myself, were administered by the Head Mistress, as before. It is frequently asserted that a hand-motor factor is a most valuable adjunct in the learning of spellings, and it was to attempt to gain some evidence on that question, rather than to throw light theoretically upon the exact working of the motor factor, that I first undertook experiments of the kind now described. Perhaps I might mention that when people say that they can tell whether a word is spelt rightly or not merely by writing it down, they tell by the look of it afterwards, its visual appearance that is, and not by a motor factor; a merely popular error of this kind need not delay us.

2. *General Plan of the Experiment.*

All the children in two Standard I classes (speaking roughly, seven-year-old boys and girls) were required to do a number of exercises in immediate memory. Some of these tests were to be memorized from visual perception only; others were to be traced in the air whilst the children were looking at them. A comparison of the results was expected to show whether there was any constant advantage or disadvantage in one method as compared with the other.

3. *Chronology of the Experiment.*

On Monday, June 11th, 1910, commencing at 11 o'clock in the morning, the two classes in succession were given four tests in immediate memory for unassociated consonants. The tests were memorized alternately from visual perception alone and from visual perception complicated by a hand-motor factor. These preliminary exercises were given so that no difficulties as to understanding might be present when the test series began. I wished also to know whether the difficulty of the tests which I proposed was such as to obtain from these children a series of steady results; these preliminary tests enabled me to make sure of this.

The tests whose results are scheduled began on Monday, June 27th, at 11 a.m. The Standard Ia class, consisting of 25 boys and 26 girls, did four exercises visually, and four exercises in which they also traced the letters in the air whilst they were looking at them. Number 1 was a visual plus hand-motor test; Number 2 was a visual test; Number 3 was a visual plus hand-motor test; and so on.

On the Wednesday following, June 29th, at the same time in the morning, the Standard Ib class, consisting of 19 boys and 23 girls, did the same exercises in the same way and in the same order.

4. *The Tests and the Method of Marking.*

Six consonants, with no associations obvious to these children, were written with chalk on brown cardboard thus:—

d n i

k w s

and exposed to view for 30 seconds.[*] In the case of the first test the children were required to trace the letters in the air whilst they were looking at them. At the end of the 30 seconds exposure, the card was withdrawn and the children were required to write down as much as they could remember. 1 minute 30 seconds was the time allowed for writing down the answer and getting ready for the next exercise.

The second card of consonants was shown, therefore, exactly 2 minutes after the commencement of the exposure of the first one. In this case the children were required to keep their hands down, but to distribute their attention as before, passing from left to right along the upper row of letters and then likewise along the lower row. It will be remembered that preliminary exercises had been given so that all matters of procedure should be clear. After 30 seconds of exposure the card was withdrawn and the children, as before, wrote down what they could remember, the same time being allowed as in the first test. Eight tests were given to each class, in the order already indicated. 16 minutes were occupied in each class by each set of tests. Tracing the letters in the air was no novelty to these children, where written letters were concerned, for they had been accustomed to do this when learning to write the letters.

It will be seen that tests 1, 3, 5, 7 were visual plus hand-motor tests, and tests 2, 4, 6, 8 were visual tests. The maximum mark which could be gained for each test was 18. For each consonant correctly remembered and correctly placed 3 marks were given, a letter correctly remembered but placed incorrectly one place before or behind its proper place received 2 marks, a letter correctly remembered but inserted two places out received 1 mark, a further displacement caused a loss of all marks.

[*] The script given here is merely illustrative. The script actually used was that ordinarily written by the teacher for the children.

5. *Results.*

The marks were tabled thus :—

STANDARDS IA AND IB. BOYS.

Name (Initials only).	Age on June 30th.		VISUAL TESTS.					VISUAL PLUS HAND-MOTOR TESTS.					Av. Visual Mark.	Av. Visual and Hand-motor Mark.
	Yrs.	Mths.	2nd	4th	6th	8th	Total Marks.	1st	3rd	5th	7th	Total Marks.		
B.F.	6	9	18	18	18	18	72	13	10	12	16	51	18·0	12·7
J.W.	7	6	7	18	15	15	55	8	15	14	14	51	13·7	12·7

and so on, making a total of 44 boys.

Then the marks for the girls of the two classes were tabled in a similar manner, the number in this case amounting to 49.

The average age of the boys was 7 years 5 months, that of the girls was 7 years 7 months; nine children were slightly over 8 years of age; three children were slightly under 7 years of age; all the rest were between 7 and 8 years. No children over 7 were below the standard classes in this Infants' school, and at this time of the school year there were *no* seven-year-old children in the senior department; so that the marks may be taken fairly to represent the memory-power for unassociated consonants of seven-year-old children in a London municipal school, situated in a neighbourhood below the average in social class.

The average mark obtained by the boys per test in the Visual plus Hand-motor exercises was 11·7 (mean variation, 2·3), and in the Visual exercises was 14·2 (mean variation, 2·0); the average mark obtained by the girls in the Visual plus Hand-motor exercises was 12·5 (mean variation, 1·9), and in the Visual exercises was 14·4 (mean variation, 1·8).

Taking the cases individually, there are only 5 boys and 6 girls in Standard Ib (the lower division) and 2 boys and 1 girl in Standard Ia (the upper division), out of 93 children, whose average Visual plus Hand-motor mark is higher than their average Visual mark.

Summarizing the results in another way we have the following table :—

TABLE III, *showing the results of Visual and Visual plus Hand-motor Memories compared, test by test.*

	VISUAL TESTS.					VISUAL PLUS HAND-MOTOR TESTS.			
BOYS.	2nd	4th	6th	8th		1st	3rd	5th	7th
Average Mark	15·8	14·3	13·5	13·2	...	13·3	11·3	11·3	11·0
M.V.'s ...	3·2	3·6	3·8	2·7	...	3·5	3·6	3·3	4·0
GIRLS.									
Average Mark	16·4	15·1	13·6	12·5	...	14·2	12·5	10·9	12·4
M.V.'s ...	2·3	3·0	2·9	3·3	...	3·1	3·7	3·0	3·6

But it remains to be seen how far the differences are common to children of different levels of proficiency in this work. That is shown in the following table:—

TABLE IV, *showing Visual and Visual plus Hand-motor Memories compared, section by section.*

Marks for Four Visual Tests.	Girls.			Boys.		
	No. of Children	Av. Mark per test per child. Visual Memory.	Av. Mark per test per child. Visual plus Hand-motor Memory.	No. of Children	Av. Mark per test per child. Visual Memory.	Av. Mark per test per child. Visual plus Hand-motor Memory.
Over 65 ...	10	16·7	14·2	11	17·3	13·7
,, 60 ...	15	15·8	13·9	5	16·0	12·7
,, 55 ...	6	14·4	12·4	8	14·5	12·4
,, 50 ...	8	13·3	10·5	6	13·5	12·5
,, 45 ...	7	12·1	11·0	10	12·2	9·2
Under 45 ...	3	8·7	9·0	4	9·1	9·0

6. *Conclusions from the second Experiment.*

The girls, as is usual in memory experiments, when boys and girls are selected under equal conditions, are found superior to the boys, but that is not the point of essential interest in this experiment. That lies in the great superiority of the Visual results over those of the Visual plus Hand-motor results. There evidently appear to be circumstances in which the motor factor, however it may operate, is really obstructive. What are those circumstances likely to be? Let us consider the two experiments with apparently different results which have just been described. The motor factor appeared to have value when the shape of the thing to be remembered was relatively unknown. It appeared to be obstructive when the perception and memory required was not of a particular shape, but of a thing whose shape was known and which could be reproduced without an attempt at faithful adherence to the shape of the model.

The children knew that they had to remember what letters they had seen, and not the particular make of the letters. Attention, therefore, to shape or expressions of the shapes seen was really outside what was required in this experiment, and diverted their mental activity into an irrelevant channel.

IV.—Summarized Conclusions from the two Experiments.

1. When the perception and memory of shape is required it seems an advantage, pedagogically, for children of this mental level, to trace the outlines of their model in the air whilst they are looking at it. Where reproduction is required of forms already well known, such tracing appears to be disadvantageous, probably from the diversion of attention to what is irrelevant.

2. The solution of the theoretical question as to the precise operation of the motor factor does not seem to me to be aided much, if at all, by the results of these experiments. The tracing of outlines in the air probably helps to secure visual attention to all the outlines of the model in some sort of sequence. The movement sensations from the moving arm are probably too inaccurate to help much in improving the percept, though this experiment does not show that to be the case. I attach some importance to the *expressive* factor, but we cannot claim to have got it even approximately purely here. And if the expressive factor is the important one, how do we explain the low results in the remembrance of the traced consonants?

In the second experiment, if the tracing the shape of the consonants in the air *was* expressive, it was mostly expressive of the exact shape of the model letter, and to that extent was irrelevant, because an exact copy of the particular letter was not required. There were cases in which children were far from copying the actual shapes of the given letters in their hand-movements; but I am not sure that they were not trying to do so. Adult teachers who have done these exercises say that they themselves make movements which only by attentive effort can they retain as tracings of the letters. On the whole, so far as these experiments go, the theoretical factors seem undetermined.

THE MENTAL DIFFERENCES BETWEEN THE SEXES

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I.—The Problem.

FOR the theory and practice of education the differences between the sexes form a matter of obvious significance. Elaborated by a male population with a male population in view, methods of teaching, range of subjects taught, time-tables and curricula have been taken over from schools for boys, and, with more or less modification, utilized for girls. How far such modification shall go is a point prescribed directly or indirectly by the various conceptions current as to the constitution of the feminine mind, the activities it is fitted or expected to undertake in society, and the activities it is able or unable to undertake in school. To formulate the constitution and activities of a particular type of mind, to determine its limitations and monopolies, to trace the particular course which it follows during development and growth, these are problems of a highly technical science. Psychology, it is true, cannot of itself solve questions of co-education or of women's suffrage; it can at most contribute one premiss in a long and precarious argument. But if that premiss is to be valid, it cannot legitimately be established by any other means.

The psychological sex differences which affect the aim and methods of the teacher are primarily those which are inborn. Those which are accessible to common observation are largely the outcome of tradition. Now these traditional differences do not necessarily imply corresponding inborn differences of mind, either as their cause or as their effect. Inborn physical differences alone might have caused them. Low-statured, narrow-chested, broad-hipped, short-legged, knock-kneed, thinly covered with muscle, thickly overlaid with fat, endowed with highly active glands and viscera, mothers in the first place, wives only in the second, women must always, in virtue simply of their own anatomical and physiological peculiarities, have been compelled to associate with each other more frequently than with men. For instance, in the simplest societies, whether the males were hunting in the forest or wandering over the steppes, the females, if only on account of their shorter stride, naturally tend to form a group apart; in our own more complex society, such segregation is conspicuously favoured by additional differences in dress. Women thus tend to grow up as a special community, distinct though not separate,—a community with its own experience and interests, its own social, domestic and industrial functions. Such a community would develop a unique mental atmosphere and tradition, independently of all innate peculiarity of mental constitution.

Nor would this tradition necessarily mean inherited mental peculiarities as its consequence. For characteristics acquired by individuals during their own lifetime are never, we are told, transmitted by direct inheritance to their offspring. The memories and habits, the ideas and sentiments constituting such a tradition would be passed on from generation to generation indirectly; they would be re-impressed and re-acquired by such agencies as suggestion, imitation, and deliberate instruction. Such a tradition may, in addition, have been favoured by preceding congenital variations; and may itself have favoured the survival of subsequent congenital variations, for any slight spontaneous variation, tending in the same direction as tradition, would be eked out and supplemented by the effects acquired from that tradition. The individuals affected by both would thus be far more likely to survive than those who possessed only one or the other. Thus, reciprocal co-operation between congenital variations and acquired traditions remains quite possible; but it is not necessarily implied. Congenital differences and traditional differences have therefore to be investigated separately; and, if the existence of congenital differences be established in the case of the mind, we have further to determine whether they are as great as, or greater than the unquestioned differences of physique.

To distinguish the inherent or essential differences from the acquired and traditional differences with which they are overlaid is a task which can be accomplished only by experiment. The most suitable method for studying the mental characteristics of the sexes is the comparative use of experimental tests. Where they resemble no tasks previously practised by the persons to be tested, psychological experiments are presumably little affected by acquired dexterity or skill. Where the influence of training is suspected, they lend themselves to various methods of control. They are equally applicable to almost any age. If the measurements resulting are at all ages much the same, it is probable that the capacities measured are constant, and therefore presumably innate. If the measurements differ at different periods of life, the character and distribution of the differences will indicate how far they are due to environment or training, and how far they are the outcome of innate tendencies whose unfolding is progressive and whose ripening has been postponed. If, as is most probable, a plurality of causes is at work, the employment of statistical devices, such as the "coefficient of multiple correlation," may enable us to assign to every cause its due degree of influences.

The task, then, which confronts the investigator of the psychology of the sexes is primarily this:—By means of experiment, to isolate the inborn mental differences between the sexes from those acquired, demonstrating their presence or absence severally in all the fundamental aspects and levels of mental process; and by means of appropriate statistics to measure their relative size, comparing them both with each other and with the measurable inborn physical differences, which co-operate in determining the gross differences manifested in daily life.

In an earlier paper in this *Journal* instances were given of sex-differences observed in tests of intelligence. Reference was then made to sex as one among a number of factors which might tend to vitiate the tests when used as criteria for intelligence of universal applicability. In the tests described the smallest differences were found in the highest mental processes: certain tests of simpler processes, such as speed of movement and sensory acuity, yielded differences which were fairly large. These larger differences might have been due to sexual characteristics unrelated to differences of intelligence, such as strength of muscle, or delicacy of skin. It was therefore suggested that the intelligence tests most free from such irrelevant influences would be those involving primarily the higher mental functions. The intrinsic interest of sex-differences has drawn more attention to the results there cited than they perhaps deserve. We propose, therefore, in the present paper to publish a fresh and completer list of measurements based upon a wider range of subjects; to analyse these measurements in proper detail and specifically from the standpoint of sex; and to preface this list and this analysis by a discussion of the more elaborate methods which are requisite in such a topic when it is treated as the central theme.

II.—Methods.

In comparing two groups of individuals in a series of capacities such as those measured by the tests, the method of comparison adopted is of the utmost moment. In estimating sex-differences several methods of comparison have at various times been used.

(1) Perhaps the most popular method has been to compare conspicuous individuals of either sex. Historical personages are enumerated

as instances of mental and moral powers. Athletic champions are cited as instances of physical achievement. It has been noticed that in diving, swimming, cycling, running, walking, throwing the cricket ball, putting the weight, the world's records for men are one and a half as high as that for women ; in vaulting and driving the baseball the men's records are twice as high. Out of the 1,030 persons of eminence in British history, but 55 are women.[1] Out of the 1,000 most eminent persons in the entire history of the whole civilized world, women are represented by only 32 ; most of these have become eminent by the accidents of beauty or birth ; the only intellectual sphere in which women are well represented is that of fiction and *belles lettres* ; here, of the 82 most famous, 10 are women and 72 are men.[2]

From such data as this conclusions have been drawn as to the relative capacities of men and women in various departments of life. Such inferences are invalid. The extreme is no index of the mean: the intellectual genius or the athletic champion is no measure of the common type. If the strongest of the men are twice as strong as the strongest of the women, it is also possible that the weakest of the men may be twice as weak as the weakest of the women. If the male sex has furnished a greater portion of geniuses, it is also possible that it may have furnished a greater proportion of fools. It has, indeed, been stated that twice as many men as women are found in asylums for imbeciles and idiots ; and in both physical and mental measurements many investigators have found that the range of variation among men is greater in both directions than the range of variation among women. We can represent this more clearly upon paper by means of the following diagram :—

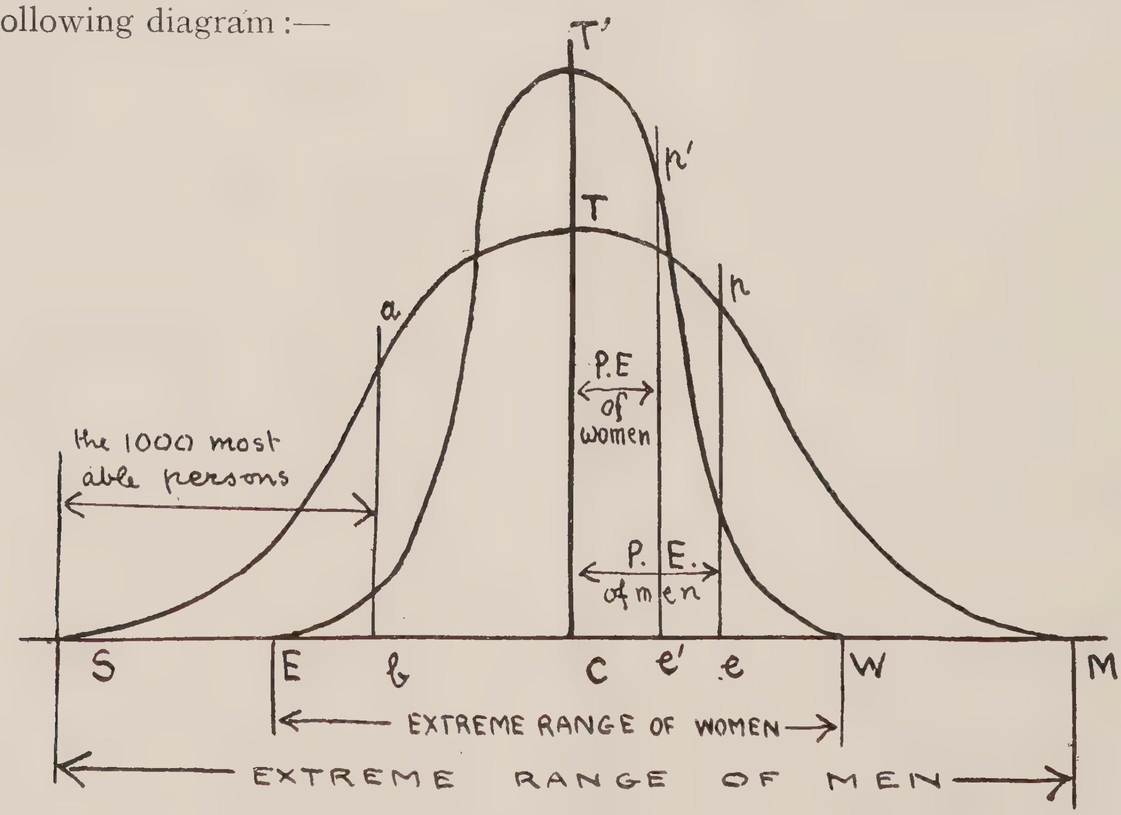

Fig 1. To illustrate Difference of Variability in the two Sexes.

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[1] Havelock Ellis, *Study of British Genius* (1904), p. 10-11.
[2] J. Mck. Cattell, *Popular Science Monthly* (1903), lxii, p. 359.

Let us imagine that all the men and women who have ever inhabited these islands have been piled up in a couple of heaps, S T M, E T′ W. They are arranged in horizontal rows in order of mental efficiency, persons of equal capacity at equal distances from left to right; where there is more than one person of the same degree of merit they are piled up on top of one another in vertical columns. Thus, Shakespeare lies upon the extreme left at S, the solitary position of extreme genius; at the other end M, is the biggest fool among the men. The tallest column (T C) represents the type of intellect which has the largest number of representatives among the men. It appears placed at C, the centre of the scale, showing that the commonest are also the mediocre. In front of the men are heaped the women, superposed upon the same scale and piled in a similar way. Assuming for the moment that the most common type of woman is of the same order of intellect as the most common type of man, the top of the pile of women (T′) will lie above the same point (C) as the top of the pile of men (T). Now, there is, I suppose, no question that the greatest woman in British history (let us suppose her to have been Queen Elizabeth) was by no means as great a genius as Shakespeare, the greatest man. It is also conceivable that the stupidest women was by no means as stupid as the stupidest man. Consequently, the intellectual range of the women (E W) may be represented as much narrower than that of the men (S M). Since the number of men and women is about equal, the female pile will be the taller, showing that women cluster more closely about their mean and resemble each other more nearly than do men.

Consider now the 1,000 most eminent personages. We may suppose these to lie to the left of a line *ab*. Such a line will cut off about 950 men, but only about 50 women. Thus, it is at once clear from such a diagram that in comparing the geniuses we are not taking fair samples of the two sexes, either in number or in quality. The extreme men may be twice as clever, and twenty times as numerous as the extreme women; and yet the general tendency of the masses may be, as nearly as possible, the same.

Hence it is of no value to compare exceptions when we wish to discover the rule. Strictly, we should take the whole population into account. Failing that, we must take a random sample, not one selected by reference to the very quality we wish to discuss. We must then compare, not the rarities, but the types; not the extremes, but the means; not the unique variations, but the general tendency of either group.

(2) We need, therefore, a single measure to represent the general tendency of each group as a whole. Of all such measures the commonest is the average or arithmetical mean. And the commonest measure of group-difference is the difference between two averages. Where the characteristics of the two sexes are measurable in numerous individuals in terms of everyday units, this is the method commonly adopted. Thus, if we wish to compare the height of the sexes we may measure

all the specimens available; add up the figures for either sex; and divide each total by the number of individuals who contributed to make it. This has been done in the British Isles on a very large scale. On measuring nearly 7,000 individuals (6,194 men and 379 women) it has been found that men have an average height of 67·36 inches, and women one of 62·65 inches. The sex-difference is expressed by stating that the men are 4·71 inches taller. By similar means it has been found that they are 32·2 lb. heavier (155 lb. as against 122·8 lb.); and can pull a weight 35·1 lb. heavier[1] (79·6 lb. as against 44·5 lb.).

This is plainly better than comparing conspicuous cases, such as counting the number of men and women over six feet, or noting the heights of the tallest pair we know. But it has two defects. It does not allow us to compare the difference between the two sexes with the differences between the various individuals; and it does not allow us to compare sex-difference in one trait with sex-differences in other traits.

In the first place, individual differences may often swamp sex-differences. Suppose we were measuring a race of giants, and that every man differed from every other by at least 6 inches; a difference between the sex averages of only 4·7 would be devoid of all significance. Suppose, on the other hand, we were dealing with a race of dwarfs, five feet shorter than ourselves; and that every male was 7·3 inches high, and every female 2·6; and that there were no discoverable individual differences; the difference of 4·7 would then be most significant. It would mean that, in height, the two sexes virtually formed two separate species. We need, therefore, a second measure to indicate the amount of individual difference. This may be done in several ways. The simplest is to calculate the range between the two extremes. Of the 6,000 men, the tallest measured 77 inches, the shortest 57; this gives a range of 20 inches; the women range from 71 to 55, a range of only 16 inches. The range of the men is thus greater by 4 inches, that is by 25%. But, as there were nearly twenty times as many men as women, the two figures are scarcely comparable. Even if we eliminated this difference in numbers, by extending either our measurements or else our calculations, the measure of extreme range would still be unsatisfactory. The extremes are perhaps the most hazardous of all measurements. Thus, the tallest woman but one measured only 69 inches, and an omission of one person might thus have altered the range by two inches, and so have made the sex-difference half as large again.

Once more we must take all the individuals measured into account. We may regard each individual difference as a variation from the general tendency of the group. We can measure it by subtracting the individual measurements from the average for the group. The average of these individual variations is known as the "average deviation" (A.D.). It yields a measure for the variability of the individuals which constitute the group. The "standard deviation" (σ) is often preferred to the "average deviation"; this is calculated by taking the squares of the deviations before summing them, and by finding their square root after dividing their total by the number in the group. In the case of stature, the standard deviation is 2·54 for the men, and 2·37 for the women. Perhaps the most intelligible measure of variability is that known as the "quartile deviation," or "probable error" (P.E.). The probable error expresses the limits within which falls half the total number of individual deviations, or, in other words, a deviation which is just as likely to be exceeded as not. It is approximately $\frac{2}{3}$ the standard deviation, or $\frac{4}{5}$ the average deviation. The significance of this will be seen on referring to the curves above (Fig. 1). If the individual deviations are due to chance, that is, to an indefinite number of indefinitely small causes operating independently, the individual measurements will be distributed in the form of the frequency-curves there pictured; they will fall equally on either side of the mean (C), and the smaller deviations will be far more frequent than the larger ones. Such a distribution is said to be normal; and the curve representing it is symmetrical and bell-shaped, like the curves there depicted. In such a case, the general tendency of the whole group may be indicated by a line (T C) cutting the whole area (the area enclosed by the curve and its base line) into two equal parts; the degree of individual variation may be indicated by the line *pe* cutting either half in turn into two other equal areas. In the case illustrated by Fig. 1, the central tendency of the men is assumed to coincide with that of the women; a quarter of the men will thus lie between the verticals TC, *pe*; and a quarter of the women will lie between the verticals T′C, *p′e′*. Hence, we can estimate the closer clustering of the women about their central tendency by comparing C*e′* with C*e*. C*e* thus measures the probable error or quartile deviation for the men, and C*e′* that for the women. In the case of stature, the probable error is 1·71 for the men, and 1·60 for the women. In this case, however, the central tendencies of the men and women do not coincide as represented in Fig. 1; they lie separated by some five inches, as shown in Fig. 2. We cannot, therefore, infer directly from the probable errors of the distributions that the men are the more variable; for, naturally, the taller the group the bigger will be the individual differences in proportion. But, if we divide either measurement by the group average and multiply by 100, we shall have a measure of variability independent of the absolute stature of the whole group. This is known as the "coefficient of variability." The coefficient of variability for the men is—

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[1] Report of the British Association for the Advancement of Science, 1883, p. 261.

$\frac{2\cdot54}{67\cdot36} \times 100$, that is, 3·8; for the women, $\frac{2\cdot37}{62\cdot65} \times 100$, that is, again, 3·8. Thus, there appears to be no difference in variability between the two sexes in regard to height.

We have seen that the reliability of our group averages depends upon the variability within that group. It depends also upon a second factor; that is the number measured. The quartile deviation or probable error of the distribution does not take this into account. To determine completely the general tendency of men as such, we ought clearly to measure the entire population of males. This is impossible. We have to be content with a small sample, such as the men measured by the Anthropometric Committee, or the boys attending a given school. The error due to sampling varies with the variability and inversely with its size. It is known as the "probable error of the mean."

We can calculate the probable errors for the respective means from the quartile deviation or simple probable error by dividing by the square root of the number in the group; and from this in turn we can calculate the probable error for the difference between the means by finding the root of the sum of the squares of the respective probable errors of the means.[1]

For a difference between two averages to be significant, it must be at least twice its probable error. Such a difference would occur by chance about once in six times; a difference three times its probable error would occur by chance once in twenty-four times.

In the case of stature the difference was 4·71; the probable error of the difference proves to be 0·08. A difference nearly sixty times its probable error would occur by accident only once in many thousand times. Hence, the difference observed can hardly be ascribed to chance fluctuations due to mere sampling. It is therefore a valid indication of an important sex-difference. The same holds good of the differences in weight and strength: these are 32·2 ± 0·5 and 35·1 ± 0·5, where the figure after the ± sign indicates the probable error of the difference.

In estimating the differences between the two sexes merely by the difference between their respective averages there is a second defect. The degree of difference in one characteristic cannot be compared with the degree of difference in another. How can we compare a difference of five inches in stature with a difference of 33 lb. in weight, or even a difference of 33 lb. in weight with a difference of 35 lb. in pulling-power or strength. How can we compare any of these with a difference in mental characteristics—with quickness of perception, retentiveness of memory, power of reasoning—when each is measured in its own units? We may convert the figures from pounds or inches into percentages; we may say men are 7 per cent. taller than women, 26 per

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[1] $$\text{P.E.}_{\text{M}} = \frac{0.6745}{\sqrt{n}}\,\sigma \text{ or (approximately) } \frac{0.8453}{\sqrt{n-1}}\,\text{A.D.}$$

where n = the number of individuals measured;
A.D. = their average deviation;
and σ = their standard deviation.

$$\text{P.E.}_{\text{D}} = \sqrt{(\text{P.E.}_{\text{M}})^2 + (\text{P.E.}_{\text{M}'})^2}$$

where P.E._{D} = the probable error of difference
and P.E._{M} = the probable error of the mean for one group, e.g., men,
and $\text{P.E.}_{\text{M}'}$ = the probable error for the other group.

The formulæ for the simpler statistical constants (average. average deviation, standard deviation, and simple probable error), will be found in Sanditord, 'Educational Measurements', this *Journal*, March, 1911, I.i., p. 36 sq., with examples worked.

cent. heavier, and 79 per cent. stronger. But this involves two dubious assumptions. It assumes, first, that an absolute zero will always be present, and will always be a true zero. This is clearly not the case. In mental measurements it is hardly ever so. In marking compositions for accuracy of reasoning or reproduction, the performance chosen as deserving no marks must be selected in a perfectly arbitrary way. Again, there is no true zero in timing the speed of a movement. No one can run a hundred yards in 0 seconds; and infinite time—the slowest theoretical time—cannot be measured at all. Secondly, it assumes that the units of measurement are of equal value all along the scale. This also is untrue. The difference between 10 and 11 seconds in running a hundred yards is a far greater difference than that between 110 and 111 seconds.

The arbitrary character of the zero point and the incomparable character of the units invalidates still more plainly any attempt to compare percentage difference in one performance with percentage differences in another. It becomes clear that the unit which determines the relative size of the sex difference is not the absolute number which measures the group average, but the general variability of the individuals in the groups. What makes a difference of 35·1 lb. in pulling-power a large sex-difference is not the fact that it is nearly 80 per cent. above the average pulling-power of the woman (44·5 lb.). If the range of the women was 1 lb. to 1,044 and that of the men from 1 to 1,079, the difference would be negligible; the majority of men and women might easily have approximately the same strength. What makes this difference a large one is the fact that the individual variations within either sex are so small (standard deviation $=2\cdot5$ for men; $2\cdot3$ for women), their range so limited (30 to 150 for men; 20 to 90 for women), that in distribution the two groups, male and female, overlap comparatively little.

We could eliminate this factor by employing a measure of variability, such as the standard deviation, as the unit; and assuming that this was equivalent for both groups and for every series of measurements. There is, however, a simpler method available.

(3) As the measure representative of the general tendency of each group, let us take some measure depending for its significance rather upon the relative distribution of the individuals than upon their several measurements obtained in terms of some conventional unit. Such a measure is the "median" or the "mode." The mode is the measurement attained by a larger number of individuals than attains any other measurement. In stature the mode is 5 ft. 7½ in. for the men; and 5 ft. 2½ in. for the women; that is, the height most commonly met with, in the case of men, is 5 ft. 7½ in. where 5 ft. 7½ in. stands for any height between 67 and 68 inches; nearly $\frac{1}{6}$ of the men measured, 918 out of 6,194, measure 5 ft. 7—8 in. The mode is thus the most frequent measurement. It designates the type. The median is the midmost measurement. It is a hypothetical number cutting the whole

group into two equal halves, so that there are just as many individual measurements above it as below. In stature the median height for men is 67·35 inches; for women, 62·55.

If the distribution of the measurement of individuals within our sample group is "normal," the three measurements of the central tendency of the whole group—mode, median, and average—should all coincide. In the case of stature (see Table I) they coincide within the limits of a fraction of an inch. This is good evidence that the distribution of stature is normal. It is confirmed by plotting all measurements as a frequency curve similar to those in Fig. 1.[1] In the case of pulling power, the three measurements do not coincide (see Table I). The distribution is somewhat skew or asymmetrical. There is a slight tendency to asymmetrical distribution in most mental measurements. In such cases the most unobjectionable measure of the general tendency is the median; this is least influenced by chance disturbances in the size of the extreme measurements, or in the frequencies of the central measurements.

Let us take, therefore, the median woman—the hypothetical woman measuring 62·5 in.—as our standard. By definition 50 per cent. of the women are taller than she. But nearly all the men are taller; namely, 5,950 out of a group of 6,194; that is, 96·1 per cent. Were there no sex difference in respect of stature only half the men would be taller, 3,097 out of 6,194, or 50 per cent. There is an excess of (96·1—50) per cent., that is, of +46·1 per cent. This expression, +46·1 per cent., therefore, measures the amount of difference between the two sexes in respect of height. This measurement is obtained irrespective of any conventional unit of measurement or of any arbitrary zero-point. It can therefore be applied to all kinds of traits and characteristics, whether physical, mental or moral; and the differences thus measured are comparable with one another, instead of being estimated incommensurably in pounds or inches, in seconds of time, school marks, or "place" or "rank" in order of merit.[2]

In Table I this method of measurement is applied to three measurable physical characteristics—stature, weight, and strength.

TABLE I

SEX DIFFERENCES IN STATURE, WEIGHT, AND STRENGTH

		Average	Mode	Median	Difference between Averages	Percentage of Men exceeding Median of Women	Excess of Percentage over 50%
Height in inches	Men	67·36	67·5	67·35	4·71	96·1%	+ 46·1%
	Women	62·65	62·5	62·55			
Weight in pounds	Men	155·0	150·0	148·19	32·2	96·3%	+ 46·3%
	Women	122·8	120·0	116·30			
Strength in pounds	Men	79·6	77·5	72·88	35·1	99·7%	+ 49·7%
	Women	44·5	40·0	36·30			

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[1] Compare also P. Sandiford, 'Educational Measurements,' loc. cit., p. 35.

[2] The essential part of this method has been described and used for sex differences in Thorndike, *Educational Psychology*, ch. iii, p. 24. Instances are also given in Myers, Introduction to *Experimental Psychology*, ch. vii, pp. 144-5.

It appears, therefore, that in physical characteristics there are considerable sex differences: in the traits measured there these differences are approximately equal. Roughly speaking, nearly 100 per cent. of the men exceed the median of the women. This can be represented graphically by plotting the frequency distributions as curves. The following curves represent the differences between the groups when the difference is about +47 per cent.:—

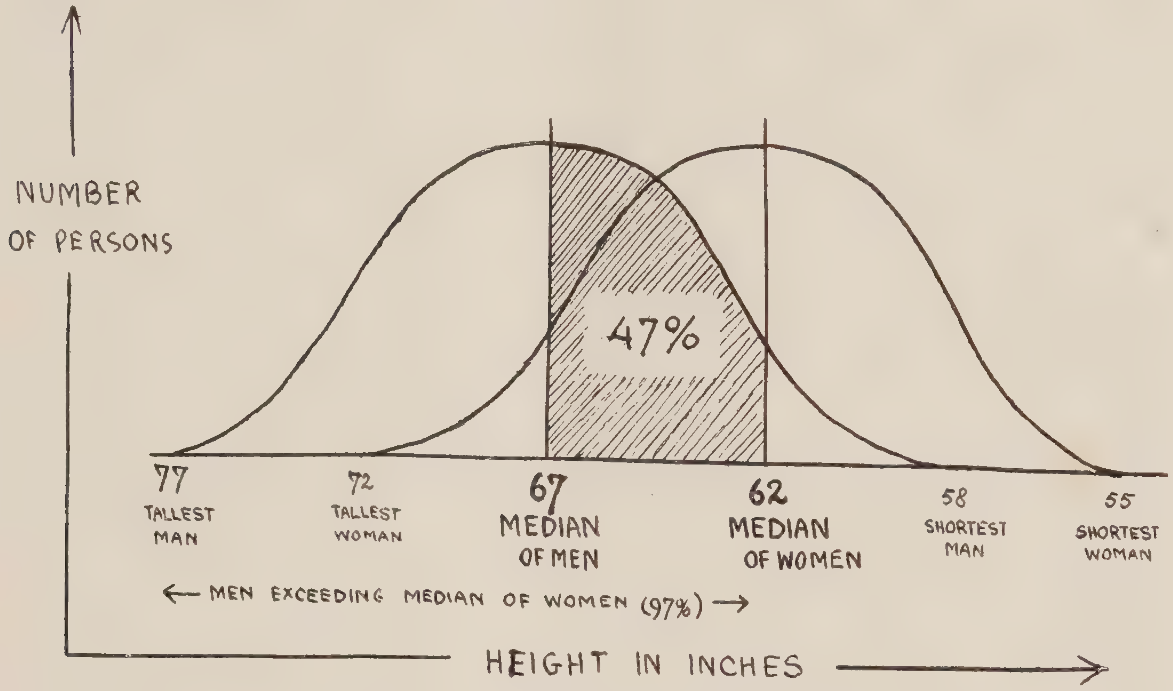

Fig. 2. To illustrate the difference in stature between the sexes.

It is clear that where the amount of overlap exceeds ±50 per cent. this method of measurement ceases to apply. If all the men exceed the median woman, we cannot say whether the lowest man barely exceeds the women's median, or whether he exceeds the topmost woman as well, much less by how much he exceeds either the one or the other. Such cases, however, seldom occur. There is nearly always sufficient overlap between the two sexes to admit the application of the method proposed.

This, then, is the method of analysis that seems most applicable to our results.

III.—Subjects.

The major portion of our results were obtained from experiments on a group of 130 children, 67 boys and 63 girls. These comprised the Junior Form at Wallasey Higher Elementary School—a school at which the forms are composed upon a basis of age. The children formed two comparable and homogeneous groups. At the commencement of the investigation they formed practically the entire number of children of a given social status within a given district between 12½ and 13½ years of age. This age appeared specially suitable. Younger children are undesirable for some of the tests, especially in the case of class tests: older children would be differentiated by puberty. At this age the sex difference in degree of general development appears to be about minimal.

In the year 12 to 13 the sex-difference in weight, both actual and relative, is at its smallest; boys are on an average only 0·3 lb., and 0·39 per cent., heavier than girls. In the following year the girls begin temporarily to exceed the boys.[1]

As the approximation to sex equality may be regarded as the result of a commencing acceleration in the growth of the girls and of a slight retardation in the growth of the boys after a preceding acceleration, it is possible that the choice of these age-limits slightly penalizes the boys. To check this possibility and to avoid others incident to approaching puberty, some of these tests have been repeated with children of nine and ten; at this age, however, boys are 8·11 per cent. heavier. Most of the tests have also been repeated upon adults.

The children of the Wallasey School were tested by one of us during the period of February, 1911 to March, 1912. The tests employed with these children had mostly been chosen as tests of general intelligence; they were intended to measure more or less complex mental functions characterizing common intellectual or practical activities, such as controlled movement, perception, association, reading, writing, reasoning, and so forth. With regard to emotional and imaginative activities comparatively little work of this nature has been done. Many writers, indeed, have been content to infer the degree or absence of sex-differences in all mental qualites from those manifested in practical and intellectual tests alone. Yet differences in emotional or imaginative equipment are comparatively independent; they play quite as material a part in determining the mental processes and moral behaviour of children as those which are more commonly made the object of experimental tests. We shall therefore incorporate a few measurements of sex-differences in emotional and imaginative disposition; they are taken from figures which have been obtained from other groups at Liverpool schools or university, and for access to which we are indebted to other workers in the laboratory. To these figures we shall apply the method of comparison described above.

(To be continued.)

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[1] cf. Report of the Anthropometric Committee of the British Association, 1883, p. 295.

THE VOICE IN TEACHING.

By Dr. P. BONNIER.*

DURING twenty years practice in laryngology I have naturally seen a great number of teachers—elementary, secondary and higher—and lecturers, and on the other hand, school children and students regularly attending lectures at the Sorbonne and Collège de France. No doubt it was often some defect in hearing or speech which brought them to me, and many of these were not good judges of professional elocution; they yet helped me to pursue the enquiry how, and to what extent, defective hearing and speech may be compatible with the practice of oral teaching. But I have also known many teachers and students who were normal in hearing and speech. I have often appealed to the school-day recollections of persons unacquainted with the business of teaching, and to many of those who have practised or undergone teaching I have put the following question:—

> " If, during an hour's lesson, you were able, by an effort of thought, to measure or weigh the amount of teaching given by the master, and the amount of that teaching which was in fact received by the hearer, what ratio would you be able to establish between the one and the other? "

This question at first embarassed even teachers, accustomed as they were to observe and record such vague things as the conduct and the application of their pupils; but, as I only asked for a very rough estimate, they generally answered pretty quickly, " Certainly not half," or " Hardly a quarter, one-tenth, perhaps." These answers were from optimists and are what were most commonly given at the beginning of my enquiries. Now they always say " Not more than one-twentieth."

According to this estimate, then, the amount of real useful brain work in an hour's lesson is three minutes. It is a poor result, and we might no doubt increase it a little without over-driving.

Unfortunately this is made impossible by the other nineteen-twentieths of the time, which are entirely devoted to a useless, tiring and deadening of the listener's brain. So much useless and injurious work is done by both teacher and pupils simultaneously as to leave no room for the increase of really profitable study. It is, in fact, as bad

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*In the April (1911) number of *La Grande Revue* there appeared an article, with the title "La Voix dans l'Enseignement." The proprietors of that Review have kindly given their consent to the publication of the English version which is here presented. The translation, which was a task of surprising difficulty, is the work of the Hon. Mrs. H. C. Dowdall, with the aid of Mr. J. Montgomery. I believe that the article will be read with interest and advantage in England. The author, Dr. Pierre Bonnier, a Paris physician, is widely known in other countries, as well as in his own, as a distinguished physiologist and as a student of Education. He gives in the present article ample evidence of his keenness and patience in investigation, of his breadth of view and sanity of judgment, and deals in an illuminating fashion with a matter of the highest practical importance for those who are concerned in any way with the profession of Teaching.

E. T. Campagnac.

for the mind to be crammed with things which it cannot digest or assimilate, as it is for the digestive organs to be loaded with more food than they can make use of. We do not all suffer from over-eating, but we have all submitted at school, and during our youth, to the system of over-feeding the brain. Our sons come up for their first degree at the cost of an inflated memory, a distended intelligence, a debilitated mentality, a flabby intellect, and a collection of ill-digested, fermented and almost useless ideas. Apart from those who are obliged by their career to keep up and carry on what they have learned at college, how many students who have taken their B.A. would be able to undergo the test again about six months later? Their brains being young and elastic unload their burden at once.

All that we have left is the twentieth part of an hour's lesson. Do we retain in after life a twentieth part of what we once learned? In class, the time which a student does not make good use of is employed in learning not to learn. He dulls his brain, he blunts the edge of his intelligence by setting it against things which he grows accustomed not to understand. What remains in his brain from what it has never taken in? Weariness and distaste, and an acquired habit of failing to understand. Would he not be better playing "prisoners base" in the playground? People have all recognized and pointed out the danger of crowding classes with students and crowding the curriculum with subjects. Our children's minds are cultivated by botanists, whereas it is gardeners they need. I do not hesitate to say, however paradoxical it may seem, that it is a great misfortune that all practical education, the direction of education, and the settlement of curricula should be entrusted to educated people. I will explain. A young man who has found learning easy during all his school days, who has taken prizes which have brought him into notice, and marked him out for the profession of teacher for the training college, has not necessarily as much aptitude for teaching as should be required of him.

I should even say that from this standpoint the fact of his having learned easily himself is far from being in his favour. He will mostly be unable to understand the difficulty that his pupils may have in understanding what they study, sometimes in even studying at all. One may make a savant and a scholar of him, but there is nothing to prove that he will be able to train others. The good teacher will be the one who has found learning troublesome, and has taken trouble to learn. He knows how to learn, and therefore probably knows how to teach. But the brilliant and gifted student who learns easily, with his ready understanding and reliable memory, will increase his own aptitude and knowledge at the training college. He will become altogether the normal school type. When he goes back to school as a teacher, his lessons to the children will be doubly beyond their age; above the reach of the ablest of his class, always in any case above that of the average pupil, and very much beyond the capacity of the weakest. In a way, therefore, the greater number of children are deserted, in a moral sense, right in the midst of their education. The teaching is hardly ever adapted to the child's capacity for learning. The teacher, being obliged to dispense his knowledge simultaneously to a large number of children of different capacity, must often wonder whether he would not lose less time and energy by taking them one at a time, or nearly one at a time, just as a butler would waste less wine, and also save time, if he filled each bottle separately, instead of pouring his wine over all of them at once. But this question of the pupils' capacity, of overcrowded classes, and curricula, is a big one, which I shall treat from one standpoint alone, that of the master's skill in the use of the voice.

* * *

All instruction which passes between the master who speaks and the pupil who hears passes in the form of vibrations of the air, or sound waves. Is still more instruction lost on its way in this form? Here we enter the domain of more easily measurable phenomena.

On the advice of M. Gasquet and with the enlightened help of M. Devinat and Mlle. Billautey, directors of the training colleges for elementary teachers, I examined a great number of children from 5 to 15 years of age who were pupils in the schools attached to these training colleges. I also examined future teachers in the last two years of their course. This was in 1906.

Amongst the children, after putting on one side those who were pointed out to me as being notoriously deaf, owing to diseases of the ear, I ascertained that 60 per cent. were obliged to make an effort in order to hear. That is to say, that in addition to the mental effort to understand, there is also an effort of the senses to hear. Now this aural tension is a muscular one, and causes fatigue much sooner than does the mental effort to understand. This effort is far more perceptible on the face of anyone who is trying to hear than on that of anyone who is merely trying to understand something which he has heard. The children of these schools may be regarded as representative in age and social position of the average child who is being educated all over the country. Therefore, if we include those who are admittedly deaf, and who, according to enquiries made in different countries, form a large proportion, we may assume that three-quarters of our school children are defective in hearing from the teacher's point of view. We must in fact regard as defective that hearing which is only maintained at the cost of an effort the child can only make intermittently.

As to the future masters, I examined the efficiency of their voices from the teaching point of view. I got each of them to deliver, in the place to which they were accustomed, a pretended lesson to imaginary pupils, explaining the subject of a few sentences to them. I investigated and so made the inquiry to what extent the teacher's voice remained within him, or very near him, or whether, on the contrary, it went forth and touched his hearers, gripping the audience where they sat instead of obliging them to reach out to him with a stretch and strain of listening attention. There again I found that 60 per cent. of these young teachers had to make an effort in order to be heard, that their voices either did not carry as far as their class or failed to grip the class at once, and that it was only occasionally, and at the cost of a raised tone, fatiguing both to speaker and hearers, that a sufficient volume of sound was attained. It appeared, therefore, that three-fifths of these future school masters and mistresses leave the training colleges without possessing that skill in the use of the voice, lacking which they can never undertake oral teaching without fatigue, both to themselves and to their pupils.

I returned with these startling figures to M. Gasquet, who told me what an enormous proportion of novices in the teaching profession become invalids during their first year of work, owing to disorders of the voice, and diseases of the throat and respiratory passages, and also what a number persevere, taking their classes in spite of increasing loss of voice, fatigued though not incapacitated, but playing fast and loose with their vocal organs and threatened by laryngeal tuberculosis, which claims so many victims amongst teachers.

I then saw M. Briand, at that time Minister of Public Education, who agreed with me on the necessity of training the voices of teachers in training colleges simultaneously with the development of other elements of the teacher's craft.

He admitted that those who are learning to teach, after having passed three years in training colleges, are launched into practical teaching without a moment's consideration having been given to the vigour, character, strength, quality or range of their vocal equipment.

I then offered to put at the disposal of the students in training colleges that experience of professional training which years of research in this matter had given me, and proposed to give practical lessons in the various colleges, so as to leave in the schools a leaven of good habits in speaking and to induce the students to afford each other mutual help in the training of the voice, and to temper each other's defects by mutual criticism. A note was taken of my offer, and I never heard anything further of the matter. I saw, without any more success, M. Gautier, later Director of Secondary Education. I also saw M. Bédorez, who did not appear to take the least interest in the subject. I then saw M. Liard, who listened to me and acted at once. I gave a few practical lectures at the Higher Training College, Rue d'Ulm, and also at the Musée Pédagogique. I had also, thanks to the generosity of Mme. Réjane, who put her charming theatre with its larger and smaller auditoria at the service of all the members of the teaching community and of the students in the training colleges, who would be willing to come and study with me, experimentally, the physical and physiological conditions affecting the use of the voice in classes and at lectures held in large halls. Although I had set apart the whole of Thursday morning for this study, not one member of the teaching community nor one pupil from the training colleges came in answer to my appeal, and during the whole year I waited in vain.

The following year M. Liard, thinking as I did that perhaps the early hour which had been chosen, and also the profane spot which I had at my disposal, did not suit teachers and pupils, got me to resume my practical lectures at the Amphitheatre Michelet, and even in the Sorbonne itself, on Thursday afternoons. And every Thursday, from 4.30 to 7, I again held myself at the disposal of those teachers who wished to study with me the special physiology, the æsthetics, and the psychology of oral teaching. My lectures must have appeared too simple to attract those who should have been interested, there being no pseudo-scientific apparatus designed to impress the public, for I intended only personal study and its direct application. This again was all lost time.

For many years I had tried to interest laryngologists, teachers of singing, elocution, and voice production, in practical study, made in the theatre itself, of the physical and physiological rules for the training and exercise of the voice, and during three years the Theatre Rejane was at the service of anyone who would work properly and scientifically at the study of the voice in singing and speaking. But if from school teachers, with few exceptions, my efforts and inquiries met with nothing more than indifference, among teachers of singing they encountered avowed hostility. I have all the more fellow-feeling, therefore, with those few people who have followed me during these three years, and who understand that there is only one way to learn anything, and that is to make a practical study of it under proper conditions. In the preface to my last edition of the lessons which I gave at the Conservatoire, I have related some details of my experiences amongst this singular company. M. Liard, whom I admire for his active goodwill in the service of education, repeatedly sent out circulars announcing my course of lectures to the educational world, but in vain. The very idea of physical and physiological conditions in practical teaching is almost entirely absent in those whose interests it concerns, but who, if they did not comprehend how needful in oral teaching are well-trained organs of speech, or how the teacher's voice should possess certain gripping qualities in order to deal properly with the young minds entrusted to him, might at least have recognized how important it was to themselves, their career and their health, that their voices should acquire during their daily vocational work that temper which the training college should have given to them. I found it easy enough to understand this animosity on the part of the teachers of singing, and especially of the Conservatoire officials, because twenty years scientific study of the voice had naturally led me to recommend, for developing and forming the voices of teachers and speakers, methods diametrically opposed to those which they employ daily for their destruction. In a profession where persons who have never studied, and who have no credentials, are allowed to undertake the care of young throats and lungs without having the least idea of their anatomy and physiology, or of the immediate danger to their career and health accruing from the hundred and one absurd and barbaric methods which form the basis of teaching both in singing and elocution; in a career where the teacher who is often reduced to undertake the formation of other people's voices, because he has been unable to preserve his own, exercises his power without criticism or control, and where the most renowned teachers are sometimes those who spread the most murderous practices, the proposal which I brought forward of introducing the effective protection of voice training and official responsibility into that devastation of voices which we constantly witness, was unlikely to please either the teachers, or even the pupils, whose intelligence is often poorer still.

There I was attacking an evil which had often been noticed and which it was rather naïvely suspected the new move was intended to remedy.

But as regards public teaching, I was attacking nothing; there was nothing to attack. The schools were training teachers and trying to develop in them such abilities as were most necessary to their career, but, as to the voice, they left that to Providence. The various people whom I saw immediately recognized the great necessity of training the voices of teachers in schools where the young are being educated for the finest and most useful career in which the voice is needed, that of public teaching. M. Liard alone thought of doing anything, and did something. But amongst those whose interests were involved, I found an indifference, a want of perception, and an apathy which astonish me yet. With the exception of a few elementary school teachers, head masters, and the head mistress of the Lycée Lamartine, Mlle. Roubinovitch, no one helped me. The last Congrés d'Hygiène scolaire, in Paris, which brought together so much ability and goodwill, left the question of the voice in teaching entirely on one side. This question which ought to be so old is absurdly new. It almost seems as if it were still too soon to broach it. It was just the same with the lawyers, whose special newspapers announced that Mme. Réjane's Theatre was at their disposal for an experimental study of the theory and practice of the laws of professional speaking. There the case was still more simple—no one came.

Is it, then, possible to set down any definite rules for training the voice professionally, particularly as regards teaching? Nothing is easier. Man does not speak for the sake of speaking, he speaks in order to say Something, and what is most important, to say Something to Somebody, and that Somebody is Somewhere. This simple fact must always be borne in mind by those who have to do with the voice. The use of the voice is a physical act or movement like our other gestures. It enables us to awaken vibrations at a distance in a person or an audience whom we wish to arrest by that audible communication, and, as in the case of all our acts, it is the effect aimed at which automatically guides our effort. I do not speak in order to awaken vibrations in myself, or to influence myself by my own sounds. I speak in order to convey to my fellows the same vibrations which my thought has awakened in me. If a particular thought arouses in me a certain vibration, according to the language which I speak, I know that that same vibration, conveyed to another person, will mechanically arouse the same thought in him. That is all we mean by language.

This effect of the voice allows us to reach those to whom we speak at a great distance, to take moral possession of them, as we wish to do, and to inspire them directly with our own thought. But, whereas in other acts the hand is guided by the eye, in this case it is the ear which guides the voice. The mechanism by which we project the voice, though marvellous in itself and of absorbing interest to the physiologist, is absolutely automatic, and we use it constantly without thinking.

Our voice has been educated by our ear. It is the ear which regulates its intonation, its meaning, its power, its pitch, its quality, its finest shades, and which also governs its range. We have only to think of something and we find the word to express it, to think of it in a certain way, and we express that word so that our way of thinking is immediately understood by our hearers. In the same way, the desire to be heard by a certain person, at a certain distance, will be enough to ensure our voice reaching that person and affecting him as we desire. It is therefore by our desire to transport our thought to our hearers and to re-think it in them that our voice reaches them. And it was in this way that we learned to speak as children: language was practically developed in us by attaching words to things, for language is at first objective. The man who, in speaking, listens close at hand to his own speech, speaks badly because he speaks to himself. The speaker who follows his own thought within himself also speaks badly because he, too, is speaking to himself. Only the speaker who follows his own thought in his hearers adjusts his voice properly; and therefore his voice becomes the vocal gesture which it ought to be. That is to say briefly and somewhat elliptically that our voice follows our thought. The expression of our face, the gesture which accompanies our speech, even the range of our voice, alter visibly according to whether we think within ourselves or within our hearers. The look of a man who wishes to reach his hearer does reach him in fact, his gestures arrest him, his voice enfolds, his whole personality radiates like thought itself. When on the contrary a man thinks within himself, trying, as he speaks, to define his own idea to himself in words, his look wanders, loses all effect, and no longer penetrates; his gestures become aimless, often they point back to the speaker, or wander, like his glance; his voice no longer comes out, and it reaches nowhere; it is smothered as if he were talking to himself. Everything about him becomes self-centred like his thought. The Someone to whom he speaks is himself, the Somewhere to which his vocal movements are directed is in himself also. When we study the different methods by which teachers of singing and elocution contrive, in so short a time, to ruin even those voices which are naturally the strongest, it is easily seen that they attain these results the most surely by just this misdirection, this telescoping of the voice.

Students of singing and elocution, who intend to go on the stage, ought to practise awaking audible vibrations, without effort, in halls measuring up to 3,500,000 cubic feet. One might suppose that such students are as a matter of course taught to practise and develop their voices in halls of this size, and to accustom their ear to control the work of their voice at the distance at which it will be required to reach and grip the audience. If painters and sculptors feel the need for studios large enough to afford them the space to stand back from their work, without which the eye cannot judge and correct the work of the hand, there is all the more reason why the work of the voice, which fills a far greater space than any canvas or block of clay, should require similar conditions enabling the ear which directs it to draw back and consciously adapt itself to the acoustic of the hall, where such works of art in the realm of song and oratory are to be executed.

There are many large places of amusement which might be used at certain hours, and every Conservatoire should have at least one hall where singers might get their professional training in conditions approximately like those in which their work will actually be done. But nothing of the sort is done. The rooms in which the Conservatoires mar the young voices they are supposed to prepare for the stage never do contain so much as a hundred cubic metres. The students work there on the scale of one to a thousand.

When they are sent out at last for their examination to a hall of ordinary size, they have everything to learn. The ear, being accustomed to guide the voice to its proper destination, goes astray in the vastness of the hall, and the student is absolutely incapable of managing the action of his voice in the space which he is supposed to fill. On the contrary, he has been trained, during his apprenticeship, to breathe, not as one whose voice must carry far and wide, and must adjust itself with certainty to the size of an auditorium, but as one who must make as much noise as possible in himself and in his own immediate neighbourhood. He has been accustomed to awaken vibrations, not in the audience, but in himself, even to vibrate specific parts of himself. One might suppose that the master would say to him "Go down where your hearers are and listen to your voice there: it is there that it must do its work; there indeed is the anvil on which you must fashion it. Let your ear be directed towards the place where your voice is to operate, and guide it there as your eye would guide your hand if you were throwing a stone. Think ahead, where your thought must go in an audible shape, fix all your will upon the space it is to fill." But this would be too simple. So the teacher says to the student, "Listen to the sound of your voice in your own chest and features. Feel the vibrations in your nose, and in your palate, and in your skull; learn to form sounds by shutting your mouth and letting your voice issue from between your eyes." So, when the student is at last called upon to use his voice in a hall measuring 30 or 40 metres in length, he has spent years in stupidly learning to compress his voice into the space between his larynx and his palate, trying to keep within himself sounds which he should be able to send at will to any distance he likes. It is as if a man learning to shoot were to have spent years in studying different positions for taking aim, looking meanwhile either at the breech, the trigger, or the barrel of his gun, without having once thought of looking at the target. A voice for Opera should be able to carry out its most subtle effects with certainty at a distance of 50 yards. It is, as a fact, trained to aim at the palate of the singer, and to smother itself in his nasal cavities, an inch or two from its point of departure. The result of this really criminal training, from which no law protects the labour and health of these young people, has been to destroy in a few years the art of singing in France, and the scourge has increased the more rapidly, because those whose voices have been crippled by their own training are soon obliged to become teachers themselves, and spread the murderous propaganda, in order to live.

It is becoming increasingly difficult to hear anything on our legitimate stage and on the lighter stage. The actors most appreciated by the public are those who have qualified in light Opera or Café concert, because these have been obliged to learn how to make themselves heard, and have also retained the habit of singing, speaking, acting or thinking, into the hall and into the audience. Antoine's reform has had this disastrous effect as against undeniable advantages, that it withdrew the actors' voices from the body of the theatre, and obliged the spectator to come upon the stage and listen and think there instead of remaining in his seat whilst the actor speaks and thinks within him as in the old theatre. An evening at the play is now a physical fatigue which one becomes less and less inclined to undergo. We go to see a piece, we no longer go to hear it.

Very few singers can really sing classical music, nor even the music that was so popular fifty years ago. It is the same with elocution and the drama. We must at least be grateful that the training of the voices of teachers has been entirely neglected in training colleges, otherwise loss of voice would be absolulely endemic.

Unfortunately laryngologists have never studied the physiology and practice of the voice in teaching, any more than teachers of singing have thought of studying, if not the physiology of the voice, at least the condition of its proper development and management in large halls. The work which I have been able to pursue with such ease for six years, that is to say, the experimental study in a large hall of the most varied kinds of voices, from the physiological and psychological standpoints, as also that of teaching, every laryngologist could have done with me or like me, and every teacher of singing or elocution might have taken part in his own way and by his own methods, more or less scientific as these might be. The sense of scientific research, and the desire for knowledge, which impels men to learn, is lacking in those who call themselves teachers, and who, having learned nothing, think they owe it to themselves to have their pupils suppose they know everything. We must be truly thankful that the voices of school children and training college students are still allowed to lie fallow, so great would be the danger of entrusting them to those who have fundamentally ruined the voices of French actors and singers.

We cannot accept this state of things. It is of the greatest importance to millions of children, to the whole of the future nation, and to thousands of teachers, that, in the training colleges, the voice should be trained equally with other qualities of the teacher. I should like to say more than equally with the other qualities. A teacher, on leaving the training college, always knows enough of what he is required to teach the children under his charge. It would appear that in the matter of teaching, quantity is more important than quality. Let our teachers teach less and teach it better. The best teaching given through an inefficient physical medium will never equal that which, though mediocre in itself, is yet affected by a medium active and penetrating which engages the aid of senses in its appeal to the mind. A bygone day required of its teachers little knowledge but a beautiful handwriting and a fine and strong voice with which to chant at a lectern. We should have carefully preserved that fine and strong voice, in order to make of our teachers such schoolroom orators as all good teachers ought to be. It is not necessary to learn anatomy and physiology in order to develop the voice and to adapt it to professional requirements, whether it is a question of the stage or of the rostrum, but it is necessary to know how to respect those physical and physiological rules which cannot be transgressed with impunity. Let the masters in training colleges accustom themselves to design and observe the students' exercises, not only with respect to matter and form, but also to the needs of the future pupils who will have to listen and understand, looking at the matter from the point of view of those young people to whom this oral instruction must be given clearly and directly. The students should habitually exact from one another a distinct utterance, otherwise the child will be obliged to make a bridge by dint of listening with its ear, straining over space which the voice and the thought of the teacher have not crossed.

Let the future teacher force himself to hold his thought, as it were, at arm's length, an arm as long as his auditorium is deep, to treat it from such a distance as will compel him to adjust his voice to the needs of his auditor. Let him see his thought embodied, set forth, and located at the place his voice ought to reach, and where are the ears and brains whose attention that voice ought to compel as if he himself strode up to them. He will see his thought become to a certain extent an object outside himself; it will acquire a certain stereoscopic relief to which his voice will lend a direct and personal power of appeal.

We have only to watch a man who is trying to convince someone, and we see that his look, his voice, his gesture and his thoughts are actually fastened on his hearer. He is literally thinking inside the latter, just as if his thought were attached to the other end of his voice and were working directly in the other's brain.

The larger the hall in which we speak, the easier it is to project our thought in the form of sounds and words, always of course within the natural limits of the voice. The speaker no longer feels the pressure or friction of his voice as it leaves him. He feels as if his voice took shape of itself in the hall, as if his thought embodied itself in the form of sound without trouble or effort. This arises from the fact that the more we precede our voice and listen to it from ourselves, the more its production originates in the front of the organs of speech. The hall itself becomes automatically our largest and best organ of resonance. When I look at the person to whom I speak, whether at a distance of one yard, or ten, or a hundred, I focus my sight accordingly, and this adjustment, which is extremely precise, is also part of a mechanism which works unconsciously. In the same way, when I aim at that person with my voice, my ears make an unconscious adjustment of a similar kind. My hearing meets my voice at that point in space where they touch my hearer. The ear marks the point where the voice should strike, just as my eye takes aim, and at the same time directs from behind the movement of my arm when I throw a stone. The vocal mechanism obeys the ear alone, and adjusts its effect in such a way as to cause direct vibrations in the person aimed at. If I am not really looking at a person it is enough for me to think of him, to place him in my mind's eye at a certain point in space when my ear will automatically direct my voice to that spot. And, furthermore, this voice, which is essentially from the mouth, is the least fatiguing and the least liable to disorders, disease, or overwork. But if, on the contrary, I do not think of my hearer, if absorbed in my idea, and in the mechanism of my voice, I concentrate that idea and attention within myself, my ear no longer aims at the point where my hearer is, but returns instead to listen to my voice at its starting point. My voice then leaves my hearers who feel themselves ignored by my whole vocal gesture, and are obliged, if they wish to hear me, to reach me by straining ear and mind and seek my voice and thought within myself, where I have imprisoned them. In this way my voice misses its objective, loses its outward form, and also sacrifices the resonance which the hall could lend it for the feeble sound of my own organs of articulation, and remains dull, smothered, muffled, and ineffective. If I am accustomed to speak in this way, allowing voice and thought to live and move and have their being within myself, my voice, deprived of the faculty of outward expansion must, in forcing itself to be heard at a distance, become hard, over-strained, inelastic; in short it grows loud instead of clear, as it should be in order to carry to a distance. This forced use of a voice of little range is absolutely dangerous, because it causes the whole vocal effort to be made from the lower and back parts of the vocal mechanism. It needs more breath and more muscular effort, and the glottis becomes hard and mis-shapen and callosities form upon it. This sort of voice was being used by sixty per cent. of the future school masters and mistresses whom I examined. This voice, then, is fatiguing to the speaker, but it also fatigues the hearer because, instead of feeling that the voice and the idea of the teacher are reaching him, he is obliged to strain his own sense of hearing towards them, and to gather at a distance the idea which the voice of the teacher should have put directly before him. Besides which, the speaker's voice and idea have lost all that body and background which would impress the senses as well as the mind. The hearer is, in a way, obliged to translate to his ears an idea which the teacher is unable to lay before him in an easily-audible shape. The æsthetics and psychology of the voice, whose proper use is the finest work of art which it has been given to man to achieve, are rendered barren and neglected, and that in speaking to children who, even more than adults, require that knowledge shall reach their minds through the senses.

The vocal mechanism may be compared to a limelight apparatus. It is a magic lantern which projects sound. Sound is formed in the glottis, in the same way as light is formed in the focus of a lamp. The muscular walls of the throat and gullet collect and deepen the sound as the mirror and walls of the lantern intensify the light in the lamp. The sound is altered, distributed, and articulated, by its passage through the cavity of the throat and mouth, the conformation and tension of the walls of which are so variable, just as the transparent picture on the plate distributes the rays of light which pass through it. The utterance of the mouth, particularly of the front parts, sends the articulate sound to a distance by striking the mass of air in front of it with more or less force, just as the lens projects a picture to a greater or less distance. The analogy is complete. It is obviously just as absurd to try to send one's voice to a distance by increasing it, as it would be to attempt to produce the picture further away by increasing the light, when what is wanted in either case is nothing but focus. And when we are seeking this focus do we keep our eyes on the screw which adjusts the lens? On the contrary, we look away on to the screen at the required distance, to see whether the picture appears more or less clearly. When the picture is clear, then we know that the lens is focussed to the right distance, so, when we wish to reach an audience with our voice, shall we concern ourselves with making our voices sound louder or softer in such and such parts of our vocal mechanism? Certainly not. We shall begin by directing our hearing into the audience, into the hall. When we can hear our voice reverberate into the hall, arresting the audience, then we shall know that our focus is right.

It is, then, the education of the ear that we must undertake. We must accustom ourselves to rely on its guidance for range, just as we do for accuracy, quality, power, and expression. It is the ear which makes the voice of the singer and of the speaker, just as it is the eye which makes the hand of the painter or the draughtsman. It is just as stupid and dangerous to concentrate the ear and attention of the singer on the sounds he is making, or, worse still, as teachers constantly do, on the actual interior of his vocal apparatus, as it would be to advise a student of painting never to lose sight of his palette or the end of his brush while he paints. The picture which is painted by our voice is in the audience, and nowhere else. There our thought must take its completed audible shape, and produce its effect itself. Speakers and singers need all their faculties, all their resources, and all their attention, to watch over the mental and audible embodiment of their idea within their audience. When a speaker or a singer turns his attention for one moment from the target of his mental and oral projectile, then his hearers are no longer touched and held by his voice, or by his ideas, which begin to wander, and, having lost their aim and their external stimulus, drift back to the vocal and mental mechanism from which they came. It is this re-entrant telescoping of the voice and thought which our teachers of singing and speaking continually inflict on their pupils and on their audiences. This illogical and fatal withdrawal of the voice has the immediate result of turning the audience into a crowd of eavesdroppers, which is a thing I should be sorry to see continued. It is an obvious misfortune that the voices of actors have been destroyed by this stupid mismanagement, and that the public, having become disgusted with our great plays, have been thrown back on cinematographs and music halls. It is inevitable that more voices, more careers and more health will be sacrificed, so long as the training of the voice is not made an object of supervision like all other forms of human labour. That the training of the voice in Conservatoires should be entrusted, without any control or responsibility, to those broken down and ignorant people, is an evil which will continue as long as those whose interests are involved, the unhappy victims themselves, do not realize their need for self-defence. The fact that the physiology of the voice in teaching remains ignored both by laryngologists and teachers of singing will not be altered, as I wrote at the beginning, until the voice becomes the object of a fashionable sport. But these are lesser evils. What ought not to be any longer is that millions of children in our schools should be subjected to a system of teaching in which the master's professional tool, that is his voice, has never been examined, cultivated, or tempered during his years of training as a teacher. Also that sixty per cent. of children have either to listen with labour, or, which is more lamentable still, to labour not to listen, to instruction which an equal proportion of teachers are unable physically to put within their reach. We may reckon that, owing to this chief point alone, this want of training of the teacher's voice, at least two-thirds of the daily instruction are lost. But I say again, we have too many botanists and not enough gardeners, so that the moral, intellectual, and physical training of the young generation seem destined to produce dried and withered specimens fit for a scholar's collection rather than good, sound fruit, full of vigour and ready to yield its life-giving seed.*

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* We have not found an English equivalent for the writer's witty use of "fruity seeds."

SINISTRALITY AND SPEECH.

By P. B. BALLARD, M.A.

In the literature dealing with Ambidexterity it has frequently been urged by the opponents of the doctrine that interference on the part of parents and teachers with the natural unidexterity of children sometimes gives rise to a serious disturbance of the function of speech; that the inference generally takes the form of an attempt to break a child of what is regarded as a "habit" of left-handedness, and the disturbance takes the form of stammering. But although this statement has frequently been made, and striking individual instances have been cited, there has never, so far as I am aware, been any attempt to ascertain statistically the prevalence of stammering among normal people, and to compare therewith the proportion of stammerers found among people whose natural sinistrality has not been allowed free scope. Nor has there been any research respecting the degree (if any) to which the speech function is disorganized.

The problem has been brought home to me by sporadic cases of stammering (a term which I use in its broad sense as including stuttering) which come under my notice while inspecting schools. Some years ago, for instance, I came across two pronounced cases in the same school. Both were naturally left-handed boys who, having learnt to write with the left hand, had been constrained by their teachers to change it for the right; and both had acquired the stammer during their school career. I accordingly made two distinct investigations into the matter, one in 1911 by means of a questionnaire, and another in 1912 by a personal examination of each case.

Preliminary Investigation: by Questionnaire.

In the spring of 1911, I issued a questionnaire to the head teachers of some of the elementary schools of South London, asking for certain information respecting left-handed, ambidextrous, and stammering children. The early returns that came in showed at once that the terms left-handed and ambidextrous were ambiguous. In some schools there were reported to be several ambidextrous and no left-handed children, and in others several left-handed, but no ambidextrous children. It was found necessary, therefore, to omit the question referring to ambidexterity. I felt the less reluctant to abandon this part of the enquiry as a personal examination of several of the cases convinced me that a child alleged to be ambidextrous always showed a preference for one particular hand in learning a *new* act of skill. It confirmed the view, in fact, that a so-called ambidexter is merely a congenitally left-handed person who has acquired such skilled activities as writing and drawing with the right hand. It was further necessary to define left-handedness, for I found that some teachers were inclined to regard a boy who usually performed even one skilful act, such as bowling or using a knife, with the left hand as a left-handed boy. The reference of the term was therefore limited to those children who performed with the left hand all the common dexterities, except those that they had been forced to acquire with the right hand. The terminology of this topic is in sad confusion, and I have no desire to add to the confusion by using new terms. Still, to avoid clumsy phraseology, I propose for the purpose of this paper to use the term dextral to mean a right-handed person ; sinistral, a left-handed person ; pure sinistral, a person whose left-handedness has never been interfered with ; and dextro-sinistral, a congenitally left-handed person who has conformed with social custom in writing with the right hand.

The results of the inquiry were as follows :—

Children observed	13,189
Dextrals	12,644
Sinistrals	545
Dextro-sinistrals	399
Stammerers	160
Dextro-sinistral stammerers	17

According to these returns over 4 per cent. are sinistral. This percentage is higher than the usual estimate ; but the number includes many who would be regarded by some people as ambidextrous. Of the total number about 3 per cent. are dextro-sinistrals. Apart from any preconceived theory of the cause of stammering we should naturally therefore expect about 3 per cent. of the stammerers to fall within that group. As a matter of fact, however, the percentage is not 3 but nearly 11.

Again, the percentage of stammerers among the total number observed is 1·2, among pure dextrals and pure sinistrals 1·1, and among dextro-sinistrals 4·3. This indicates that stammering is about four times as frequent among dextro-sinistrals as among the rest of the children. After these statistics had come in I conceived the idea of obtaining similar data concerning a different type of child. I accordingly made inquiries at seven schools attended exclusively by mentally-defective children, and obtained the following figures :

Children observed	944
Dextrals	882
Sinistrals	62
Dextro-sinistrals	47
Stammerers	23
Dextro-sinistral stammerers	9

Here the results are more striking. Sinistrality reaches 6½ per cent., and while only 5 per cent. of the children are dextro-sinistral, 39 per cent. of the stammerers belong to that group. The percentage of stammerers among the dextro-sinistrals and the non-dextro-sinistrals reaches 19 and 1·56 respectively; that is, it is about twelve times as great among the former as among the latter. The schools selected for this inquiry were of varied types, and in each case all the children in each department were taken into consideration.

It may be contended that the figures do not necessarily support the hypothesis that there is some connection between stammering and interference with the natural "handedness" of a child; but rather that there is a connection between stammering and left-handedness. The detailed returns, however, lend no colour to this alternative view, for most of the cases of pure sinistrality occur in a few schools where the head teachers are in sympathy with the views expressed at the close of this article, and in these cases there happen to be no left-handed stammerers.

I was not altogether satisfied with this investigation, as it was only a small percentage of the cases that I personally examined.

Detailed Investigation: by Individual Examination of Cases.

In the early part of this year (1912) I made a careful examination of 322 distinctly left-handed children. All doubtful cases were rejected. The total number of children in attendance at the schools from which these sinistrals were drawn amounted to 11,939. This is the outcome of the inquiry:

	Boys.	Girls.	Total.
Total number of children	6,181	5,758	11,939
Pure sinistrals	25	26	51
Dextro-sinistrals	193	78	271
Pure sinistral stammerers	0	0	0
Dextro-sinistrals who stammered at time of inquiry	32	14	46
Dextro-sinistrals who stammered earlier in their school career but not at time of inquiry	21	3	24

The evidence for the earlier stammering referred to above rests mainly on the confession of the children; but as they seemed to be somewhat ashamed of the defect, and disposed to conceal it as far as possible, there seems to be no reason for doubting their word.

It is seen that the percentage of sinistrals is 2·7, or, separating the sexes, 3·5 for boys and 1·8 for girls. It is frequently mentioned in medical books that stammering is far more prevalent among men than among women. The more fundamental fact seems to be that left-handedness is far more common. There are probably about twice as many left-handed men as there are left-handed women.

Among the dextro-sinistrals 17 per cent. stammer at present and 25·8 per cent. have stammered during some period in the past. They are not all cases of bad and persistent stammering. In many instances indeed the child stammered merely when reading aloud or when excited in any way.

It is highly significant that among those cases where no serious attempts had been made to change the skilful hand, not a single instance of stammering appeared.

The reader will not fail to be struck with the marked discrepancies between the results of the two inquiries. These discrepancies are due to differences in the fields of inquiry and in the methods of investigation. The first inquiry dealt with all children ranging from the ages of 4 to 14; the second was limited to children between 8 and 14. There was some overlapping of the school areas, many of the children concerned in the first inquiry appearing again in the second; but much new ground was covered. The more important factor, however, was the method of procedure. A questionnaire is often perfunctorily and carelessly answered. In the second investigation the selection of sinistrals was stringent and the tests and inquiries thorough. The second results are consequently far more reliable.

The following case reported to me by the head teacher of one of the schools is clearly evidential: "D—— B—— came to this school on February 2nd, 1908, and entered Standard VI. On admission she stammered, was left-handed, and had been made to write with the right hand. For two years she was allowed to use her left hand, and the stammering disappeared. Her parents then stated their intention of sending her to the C—— (secondary) school, and finding on inquiry she would be compelled to use the right hand, I advised practice. Hesitancy in speech followed and slight stammering. She left on July 10th, 1911."

In view of all this evidence it seems impossible to escape the conclusion that some sort of connexion exists between "handedness" and the motor mechanism of speech, so that a disturbance of the former gives rise to a disturbance of the latter—a conclusion which suggests a further problem. Is the disturbance confined to the physiological apparatus concerned in the production of articulate speech, or does it extend further and invade the complex psycho-neural realm concerned in verbal imagery and thought? In other words, is the general lingual efficiency of the sinistral impaired by interference with his sinistrality?

Dextro-Sinistrality and General Lingual Efficiency.

Dr. G. M. Gould records the case of a naturally left-handed friend who was compelled when a child to write with his right hand. For all other acts he was left-handed. All through his life he hated writing, and never seemed to be able to use his pen and his brain at the same time. If he tried to write while thinking there was a positive inhibition of thought. But as soon as he laid down his pen and started dictating to a stenographer his ideas flowed freely and rapidly.* Doctor X told me the case of his little boy whose speech was delayed for two years by what he now regards as an ill-advised attempt to change the child's sinistrality. It was to solve this more general question of the relation between speech and sinistrality that the second investigation was originally made. I strongly suspected that the lingual ability of dextro-sinistrals was below the normal, but the results of my researches have entirely falsified my expectations. Two queries were raised: First, How does the lingual efficiency of the child, as disclosed by his success at the terminal examinations in reading, composition, recitation, &c., compare with the class average in these branches? Secondly, How does his lingual ability compare with his abilities in other directions, such as mathematics and drawing? The tabulated results are as follows:—

	A	B	C		A^1	B^1	C^1
Pure sinistrals ...	49	12	39	...	47	18	35
Dextro-sinistrals...	45	16	39	...	42	22	36

A = Percentage of children whose marks in English were above the class average.
B = Percentage with marks equal to the class average.
C = Percentage with marks below the class average.
A^1 = Percentage of children with marks for literary subjects higher than the marks for other subjects.
B^1 = Percentage with about equal marks for both kinds of ability.
C^1 = Percentage with lower marks for literary subjects.

These results tend to indicate that sinistrals, as a class, are in no way deficient in their general power of verbal expression; for although the pure sinistrals are better than the dextro-sinistrals, both are better than the dextrals. The numbers are manifestly too small to justify us in pressing this inference, for the superiority in the cases examined may be accidental. The results were so unexpected that I obtained further data which would serve as some sort of check. I obtained records of the position on the last terminal examination lists of 43 pure sinistrals and 187 dextro-sinistrals, and found that a position in the first half of the list was held by 25 pure sinistrals and 104 dextro-sinistrals; that is by 58·1 per cent. of the former and 55·6 per cent. of the latter.

If the numbers may be taken as typical, they point to a slight deterioration both in lingual and in general ability, resulting from attempts to make sinistrals ambidextrous.

We must now consider the dextro-sinistral stammerers as a separate class. Dr. Edward Conradi gives statistics to show that stutterers are, as a rule, backward in their school work.† This retardation he believes to be due to psychic depression brought about by the mockery to which the child is exposed. If this explanation is sound, the backwardness would be a secondary effort and not an immediate and inevitable effect of that which caused the stuttering. My own results are at variance with Dr. Conradi's. The marks obtained by the stammerers in English, which includes reading and recitation, are, as might be expected, rather low; but in general ability, as indicated by the class lists, they are, on the whole, rather above than below the average. My researches, however, were limited to dextro-sinistrals.

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* Appleton's "Popular Science Monthly," Oct., 1904.
† See "Journal of Educational Psychology," Vol. III, No. 1, pp. 35-38.

The conclusion at which we arrive on the general question is that although dextro-sinistrality tends to give rise to stammering there is little or no evidence that it produces a wider disturbance of the function of speech, beyond what stammering itself inevitably entails.

The Sinistral System.

How is the stammering to be explained? Brain physiology is clearly indicated as the ultimate ground of explanation. But before we enter this speculative region, it would be well to determine what are the facts of dextral and sinistral asymmetry that are open to common observation. What are the phenomena that go together? Are all the organs on one side of the body more efficient than the corresponding organs on the other side? Does the superiority refer to the organs of movement alone, or does it refer to the organs of sensation as well? Does dextropedality, for instance, always accompany dextromanuality? And what is the nature of dextrocularity? Dr. Gould, in the article referred to above, asserts that the root fact is dextrocularity. He regards the predominance of the right eye as the initial fact of dextrality. We are right-handed because we are right-eyed. In playing the fiddle, for instance, the fingering is done with the left hand, for it is thus that the right eye can the better observe the movements. If this theory were sound, one would expect to find the correlation between dextrocularity and dextromanuality to be nearly absolute. Right-handed people would be right-eyed, and left-handed left-eyed. By means of a simple instrument constructed out of a cigar box I tested the eyesight of several children with a view to discovering the dominant eye. It is obvious that an experiment of this kind is complicated by peculiarities of vision due to astigmatism, different focal lengths for the two eyes, and so forth. An effort was therefore made to select children whose eyesight seemed to be normal. The lid of the cigar box was fastened and the ends of the box removed so that it formed a sort of rectangular tube. Over the middle of each open end a piece of black thread was stretched. The child tested was asked to take the box in both hands, look through it, and adjust it in such a way that the two threads covered one another and were seen as one. The 60 boys tested in this way seemed to secure the alignment without much difficulty. 46 used the right eye and 14 the left. Out of the 74 girls tested in the same way, 48 used the right eye and 12 the left, and 14 failed entirely to see both threads as one. The only left-handed girl among them used the right eye. The girls were on the whole very much slower in "sighting" the threads than the boys.

The same sort of experiment was made in another school, with the difference that the box rested on a table and the children were not allowed to touch it with their hands. The results tended to confirm my suspicion that in the previous experiment the right hand tended to drag the box towards the right eye; for in this case only 33 boys out of 60 used the right eye, and only 35 girls out of 60. In all these cases the children were right-handed. Out of 41 left-handed children tested in the same way 23 used the right eye.

Dr. E. O. Lewis has supplied me with the results of some very careful tests he has made on 200 right-handed children, using a method slightly different from mine. He found that 70 per cent. used the right eye, 20 per cent. used the left, and 10 per cent. used either eye indifferently. These results accord more nearly with those at which I arrived in the first school referred to above. In dealing with left-handed children he carefully excluded those whose sinistrality was doubtful—those who did not do everything requiring skill with the left hand. He found 12 such boys to be distinctly left-eyed.

The figures on the whole lend support to the view that the preference among school children for the use of the right eye is but slight and in no way comparable with the preference for the use of the right hand, and (as far as my own figures are concerned) the right-eyedness has no essential connexion with dextrality.

In my recent examination, &c., of sinistrals I carefully tested their vision with a view to finding the "fixing" eye. I found it best to discard all apparatus and to adopt the following simple plan. The child was asked to stand at the one end of the room while I sat at the other and covered my left eye. He was then told to stretch out his arm and with both eyes open point to my right eye. I could, as a rule, tell immediately which eye he was using for the alignment. This test was repeated in various forms, such as by pointing with the other hand, or forming a loop with the thumb and index finger and looking at my eye through the loop. The result is generally quite definite: one eye is persistently used for purposes of alignment. Of the 51 sinistrals thus tested, 57 per cent. proved to be right-eyed and 43 per cent. left-eyed. The corresponding percentages for the dextro-sinistrals were 55 and 45.

It will be seen, therefore, that this theory of the priority of dextrocularity (or sinistrocularity) is disproved by facts that can easily be verified. If the theory could be established it would fail to support the doctrine that the fundamental source of all dextral phenomena is the superior development of the left cerebral hemisphere, and of all sinistral phenomena the superior development of the right cerebral hemisphere. For the anatomical relations between the eyes and the cerebral hemispheres are of an entirely different nature from the relations between the hands and the hemispheres. The right eye is not, like the right hand, connected with the left hemisphere only: it is connected with both hemispheres, the nerve fibres from the right half of each retina proceeding to the right hemisphere, and the fibres from the left half to the left hemisphere. To be right-eyed is not therefore, as in the case of right-handedness, to be left-brained.

Another fatal objection to the theory is to be found in the fact that among people born blind the proportion of dextrals and sinistrals is about the same as among sighted people. This same objection holds against the hypothesis put forward by Mr. H. C. Stevens, who claims that certain experiments made by him indicate that a difference in the perception of size exists between the right and left halves of the retinæ of both eyes. *When two discs of equal size were so presented that the image of one would fall on the margin of the right half of the retina, and the image of the other on the margin of the left, the disc to the right of the observer was generally judged to be the larger. Mr. Stevens made 183 observations altogether, and found that to 100 persons the right disc appeared larger *to both eyes*, and to 45 persons the left disc appeared larger to both eyes. Of the 100 persons to whom the right disc appeared larger, 76 were right-handed, 8 ambidextrous, and 16 left-handed. Of the 45 persons to whom the left disc appeared larger, 15 were right-handed, 3 ambidextrous and 27 left-handed. Mr. Stevens cites these figures in support of his theory that if the reflex arc concept is valid, the ascendancy of the left hemisphere must in the first instance exist in the sensory neurones. "Where there is motor bilateral asymmetry there must first be sensory bilateral asymmetry." He explains the development of right-handedness by saying that "objects situated in the right half of the field of vision of a left-hemisphered infant would, by appearing larger, attract its attention." "The fact that the predominant use of the right hand is developed by trial and error is against the assumption that there is a natural prepotency in the path of discharge into the right arm. If it were merely reflex there would be no period of uncertainty in which both arms are used. A fact which supports the view suggested here is that the time (7 months) at which pronounced right-handedness developed in Baldwin's child was but a little later than the time (5 months) at which Raehlmann found that an object was recognized when its image fell on the periphery of the retina."

The fact that people, blind from birth, exhibit the same dextral or sinistral proclivities as normal people disproves that Mr. Stevens has discovered the fundamental factor. It may be further pointed out that the judgments of size involve the higher mental processes, and that they were made, as was inevitable, by subjects whose dextrality or sinistrality had already been developed. There is no proof of asymmetric sensibility pure and simple in the retina, still less is there a proof of a particular kind of causal nexus between retinal sensibility and right or left-handedness. *A* may be the cause of *B*, or it may be its effect, or both may be the effect of a common cause.

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* Right-handedness and Peripheral Vision: Science N.S. Vol. 27, pp. 272-273. (1908.)

Is there evidence of greater tactual sensibility on one side of the body than on the other? Or that right-handed or left-handed people hear better on different sides? In the absence of such evidence we must confine our attention to the motor phenomena. It will readily be admitted that finer kinæsthetic discrimination necessarily accompanies the more complex motor co-ordinations involved in the superior skill acquired by hand or foot, but the physiological factors open to ordinary observation are motor rather than sensory.

It can be shown that right-footedness generally goes with right-handedness, and left-footedness with left-handedness. Since it is but rare that any delicate art of skill has to be performed by the foot, it is very difficult to ascertain which is the more dextrous of the two. Out of 153 children who were tested in jumping I found that 94, or 62 per cent., made the leap with the right leg. The percentage of those who used the right leg increased somewhat with the ages of the boys. In playing football about 75 per cent. of the boys showed a preference for the use of the right leg. Dr. Lewis found the 12 left-handed boys referred to above to be also left-footed. It may well be doubted whether in the matter of jumping and kicking, the element of skill, as distinct from strength, is sufficiently pronounced to serve as a criterion of dexterity. The muscular development of the legs is brought about almost exclusively by exercise in walking; and as each leg gets an equal amount of practice there is but little reason to anticipate that in mere feats of strength preference would be given to either leg. I myself, for instance, seem to use both legs indiscriminately for jumping and for kicking a ball, but I find by trying to write with my feet (an art which is not difficult to acquire) that I have much greater control over my right foot than my left. The testimony of some of my friends, whom I have induced to experiment in the same way, accords with my own.

In my more recent examination of sinistrals I endeavoured in each case to discover the more skilful leg. I had to rely mainly on the judgment of the children themselves. The majority of the boys were emphatic in stating that they could play football more skilfully with the left leg than the right. It was, as a rule, more difficult to get a decided statement from the girls. The children were further requested to trace out words on the floor with their feet, and to state which foot they could the more easily control. A few boys were put to write and draw with their feet, by means of pencil and paper. This, of course, involved taking off shoes and stockings and was open to certain objections. Moreover, it was quite impossible to tell from an examination of the results which of the two feet was the more skilful: they seemed equally awkward. This method was consequently abandoned. By applying the other two methods I found that 88 per cent. of the pure sinistrals were left-footed, and 86 per cent. of the dextro-sinistrals. It is not improbable that if acts of greater skill were required of the foot a still higher degree of correlation between hand and foot would be revealed.

We seem justified in concluding that the hand and the foot on the same side of the body are related to the same group of dextral or sinistral phenomena. Since these organs are connected with the same cerebral hemisphere, it is a reasonable hypothesis that other organs whose movements are controlled by the same hemisphere partake of the same sort of asymmetry. That the vocal muscles are concerned in dextral and sinistral asymmetry is a commonplace of physiology. Although these organs are anatomically connected with each hemisphere they are, as a matter of fact, functionally connected with one only. The researches in aphasic disorder have established the fact that the vocal organs are normally controlled by the superior hemisphere—by the hemisphere that controls the skilful hand and foot. Dextrals have their speech centres in the left hemisphere and sinistrals in the right. Sinistrality, therefore, affects the motor co-ordinations of the right arm, the right leg, and the vocal apparatus; and functionally connected with them all is the right hemisphere.

How does this sinistral system hang together? How did the asymmetry originate in the life of the individual? Was it, as Plato thought, and as the modern advocates of ambidexterity teach, a mere matter of accident or training that the left hand started to gain an advantage over the right? And did the left hand then educate the right hemisphere and the right hemisphere transmit the advantage to the left foot? Or was the left-handed child born with a right cerebral hemisphere slightly different in structure and in function from the left? Modern physiology favours the latter view, and regards the basal fact of dextrality or sinistrality to consist in congenital cerebral asymmetry.

Physiological Explanation of Dextro-sinistral Stammering merely speculative.

Are we now in a position to give a physiological explanation of the prevalence of stammering among dextro-sinistrals? To the facts adduced above must be added the teaching of physiology regarding the special cortical centres concerned in speech. It is a generally-accepted theory that there are in the normal adult four highly-specialized centres involved, the auditory, visual, vocal, and graphic word centres, and that these four centres are situated in the dominant hemisphere. The sinistral system of the left-handed child, who can speak but has not started writing, contains as related factors a superior right cerebral hemisphere in which have been developed two sensory and one motor speech area and a superior left hand. If this left hand is used in the acquisition of the art of writing, a writing centre is believed to be developed to accompany the other three in the dominant hemisphere. But what happens when the right hand is used for writing? We are driven to assume that in this case the writing centre forms in the inferior hemisphere. But how can this in itself give rise to stammering? The mere establishment of a highly-specialized centre in the inferior hemisphere is not in itself a sufficient cause. It is difficult not to believe that a centre is so formed in the case of a right-handed violinist, and no special tendency to stammer is observable among this class of people. The secret probably lies in the intimate functional connexion of the writing centre with the system of word centres, and particularly with the speaking centre. Whenever writing takes place all the language centres are probably active, ideationally if not perceptually, and the extent to which nascent or partial articulation accompanies writing depends upon the type of child. The pathological explanation of stammering is obscure, but there is little doubt that the motor speech area is the seat of the disorder. No lesion is discoverable: the defect is functional merely, thus differing from all forms of aphasia.* There is no lack of effort, no lack of innervation—of a kind; but the current runs into the wrong channels. The right co-ordinations are not promptly brought about. This may conceivably be due to two causes. Either the special motor area itself is enfeebled, in which case the defect is analogous to the stammering of young children when they first learn to speak; or there is some sort of functional conflict leading to inhibition, hesitancy, or stammering. What precisely happens in the case of dextro-sinistral stammering is purely conjectural. It may be that the writing centre alone is formed in the left hemisphere, or it may be that, as some have contended, the writing centre "drags" the other centres to its own side; or it may further happen that, as the advocates of ambidexterity affirm, two sets of speech centres are developed, one in each hemisphere. In any one of these cases it is conceivable that the dominant speech area is either robbed of some of its energy, or that some sort of competition takes place which tends to disorganize its function. These speculations, however, cannot, so far as I am aware, be either confirmed or refuted by established physiological facts. It is more profitable therefore at present to pass on to the practical issues.

Pedagogical Inferences.

If we neglect the question of social conformity it is clear that there is nothing to be gained by trying to make a left-handed child right-handed. There is a grave risk of stammering resulting from the change; and there is no gain in mental power. It is true that the ordinary parent and teacher do not encourage the cultivation of the sinistral's right hand with a view to improving his mental capacity, but merely with a view to removing a peculiarity; but the members of the Ambidextral Culture Society do maintain that both hands should be so cultivated as to be able to perform all skilful acts interchangeably. And the reason alleged is that brain power is considerably increased thereby. Moreover, attempts have been made to introduce ambidextral drawing and writing into the elementary schools. I am not here concerned with refuting the doctrine of ambidexterity, but with pointing out that the sinistral may be changed into a dextro-sinistral by the unsophisticated parent or by the cultured advocate of ambidexterity. The former tries to make the boy write exclusively with his right hand, the latter tries to make him write with both interchangeably, or even simultaneously. Both types of sinistrals were examined by me in my recent investigation, the child who then preferred writing with his right hand, and the child who used his left when nobody was watching him; and both types seemed equally inclined to stammer. It appears, therefore, that no kind of interference with the natural sinistrality of a child is educationally justifiable.

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* It is held by Th. Hoepfner, however, that stuttering is momentary aphasia due to associational defects. (Quoted in the "Journal of Educational Psychology" for January, 1912, p.53.)

The results of these researches throw some light upon the wider question of ambidextral culture. A large proportion of the dextro-sinistrals examined were virtually ambidextrous. For the same kind of act they used the right hand in public and the left hand in private. A distinction may be made between two ambidextral ideals; one which demands a more even distribution of dexterities between the two hands, and another which demands a duplication of dexterities. To the former there can be no objection, if we make the important proviso that *writing should always be done by the superior hand.* There is reason for thinking that the pure sinistral approaches more nearly this ambidextral ideal than the pure dextral; for our manufactured articles are made for the right-handed, and the sinistral is forced to use his right hand more frequently than the dextral is forced to use his left. And it is not impossible that the slight intellectual superiority noted among the sinistrals is due to this cause. The skilled violinist, although dextral, achieves very intricate and rapid co-ordinations with his left hand, and no disturbance of speech has been observed to follow.

When, however, we consider the second ambidextral ideal we must modify our approval still further. It is, of course, desirable that certain acts of a lower level of dexterity can be performed equally well with both hands; and some callings, such as surgery, require interchangeable dexterities of this kind; but, generally speaking, if a high degree of delicate skill is to be acquired, it should, on the principle of economy, be acquired by one hand only. Moreover, the duplication of the graphic function has been shown to be fraught with danger. Writing should always be done by the superior hand, and *by the superior hand exclusively.*

Summary.

1. Stammering is much more frequent among left-handed children than among right-handed.
2. Left-handed children are of two classes: those who always write with the left hand, and those who sometimes or always write with the right. Among the former stammering is rare, among the latter (whom I call dextro-sinistrals) it is frequent.
3. The proportion of stammerers among normal children is probably not higher than 2 per cent.: but among dextro-sinistral children of school age the percentage is 17. One in every six stammers;

and, if the past school career is taken into account, one in every four.

4. There is insufficient evidence to show that the disturbance of the speech function extends beyond the mechanical control of the organs of articulation, although there is some slight indication that left-handed children deteriorate somewhat through being forced to write with the right hand.
5. The phenomena of dextrality (in its broader sense) are manifested in motor rather than in sensory bilateral asymmetry. The basal fact seems to be the predominance of one of the cerebral hemispheres.
6. The physiological explanation of the manner in which dextro-sinistrality causes stammering is obscure; but the disorder is probably due to interference with the normal development of the speech centres.
7. The act of writing, rather than any other skilful act, seems to be the disturbing factor.
8. It follows that the art of writing should be practised by the superior hand, and by the superior hand only.

THE TEACHING OF SPELLING.

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EMPLOYERS frequently complain that of the children just leaving school, who apply to them for posts, a large number are unsuitable because of their inability to spell correctly.

It must be admitted that the orthography of the English language is most intricate and irregular. The young child has to master a spelling whose general rules are relatively few. The alphabet contains only twenty-six letters to represent some forty-five different sounds, whilst invasions, dialects, and compositors' errors have added still further to the confusion.* So much in dispraise of English spelling has been written, however, that it is unnecessary to trace its history once again or to give another enumeration of its imperfections.

The object of the present investigation is to examine the actual spelling of the children of the elementary schools, firstly, in order to bring out the effect of the method of teaching reading in the spelling of young children; secondly, to examine the nature of spelling errors made by older children; and thirdly, to tabulate and compare the results obtained from the first and second tests, in order to find out whether children in the upper school meet with the same difficulties as the beginners.

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* cf. Meiklejohn "Spelling List" Introduction.

The tests consisted of dictated passages; the same passage was used in all three schools for children of corresponding ages. For the infants a paragraph was selected from a simple but unfamiliar reader; for the older children a passage with very little sense was composed, with the object of bringing together the commonest spelling errors, without going outside an ordinary upper standard child's vocabulary. The results show that the paragraph proved rather difficult.

I.—The effect of Reading Method on Spelling.

In the March issue of this Journal, a comparison of results obtained by various reading methods was made. Three schoools, X, using the "Dale" method, Y, another "Phonic" method, Z, the "Sentence" method of teaching reading, were examined.* The first and second standards of these schools were used for the dictation test, for which the following paragraph served:—

> In a field | of young green wheat | a
> lark | had made her nest. | In this nest |
> were four little baby larks. | The
> mother | had to fly away | every day |
> to get them food. |

The children were told they were going to have a piece of dictation. The paragraph was read straight through that they might gain some idea of its meaning. It was now dictated in short phrases as indicated by the dividing lines.

The results are given in three summaries. The first tables, AI and AII (for Standards I and II respectively), show the number of children examined, their average age, and the average class mistake for each school. Table B classifies the words spelt wrongly, and Tables C and D show the causes of error in detail. A certain number of papers were rejected because they were unreadable, and do not appear further in the summaries.

In comparing the results, it is necessary to remember that the chilren at Z (Std. I) had only commenced to read some nineteen months previously, and consequently had had so much less opportunity of learning to spell than the other first standard children whose reading experience extended over two and a quarter years. For the children in Std. II, another year must be added to those periods. Moreover, at X and Y, special care is given to the spelling, through actual spelling lessons, at least once a week, whereas at Z no attention whatever is paid to spelling, except incidentally during reading and composition lessons.

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* The schools were the same as those indicated by these letters in my article on *Methods of Teaching Reading.* (V. March number of this *Journal.*)

TABLE AI (STANDARD I).

Class Average Errors.

SCHOOL ...	X	Y	Z
No. of children tested ...	43	47	106
Length of reading experience	2¼ yrs.	2¼ yrs.	1 yr. 7 m.
Average age	7 yrs. 10 m.	7 yrs. 3 m.	7 yrs. 6 m.
No. of papers rejected ...	3	6	6
No. of words wrong... ...	234	240	617
Average class error	5·9	5·9	6·2
Mean variation of error ...	3·4	3·1	3·0

The results are remarkably even; although X and Y show a higher percentage of rejected papers than Z, they have a slightly lower Class Error. In view of their longer reading experience and greater spelling practice, this is not surprising. On the other hand, the slightly lower Mean Variation of Error indicates a greater consistency amongst the spelling of the children there.

TABLE AII (STANDARD II).

Class Average Errors.

SCHOOL ...	X	Y	Z
No. of children tested ...	85	51	59
Length of reading experience	3¼ yrs.	3¼ yrs.	2½ yrs.
Average age	8 yrs. 9 m.	8 yrs. 11 m.	8 yrs. 3 m.
No. of papers rejected ...	—	—	1
No. of words wrong... ...	195	177	167
Average Class Error ...	2·3	3·5	2·9
Mean Variation of Error ...	1·5	2·7	1·8

In this Table there appear some slight differences. Z has one rejected paper, for which a feeble-minded girl was responsible. The lowest Average Error occurs at X, the highest at Y, in spite of the attention specially given to spelling in that school. This, however, is accounted for by the character of the class, which contains children ranging in age from 7 yrs. 3 mths. to 12 yrs. 4 mths. The young children had been recently promoted; the older ones were of the type which stays for two or three years in the same class. Nevertheless, it is worth noting that Y returns the greatest number of correct papers: the Average Error for the first thirty-two papers there (average age, 8 yrs. 9 mths.) is only 1·3, as compared with 7·1 for the remainder (average age, 9 yrs. 3 mths.). This great difference in the pupils' spelling ability is best indicated by the Mean Variation of Error which is highest for Y and lowest for X. Further, there is shown a greater increase in spelling efficiency at X than at Z, whilst the same might be remarked of the children at Y, since three-quarters of the class are below the class average spelling error.

But the children at Z are six months younger than those at X, and they have been learning to read only nineteen months, as against two and a quarter years in the case of X and Y. From the point of view of *time* spent in reading, the comparisons should be, therefore, between Std. II at Z and Std. I at X and Y. We should then find a very great increase in efficiency brought out by the Average Errors, which are 2·9 for Z, 5·9 for X and Y. That is to say, in equal times, the reading method used at Z seems much superior, so far as spelling efficiency is concerned.

Table B shows details of the mistakes and indicates the part played by the sound of the word in spelling. The percentages are reckoned on the total number of words wrong. The mistakes are classed, in the first place, as being Phonetically Spelled, either in accordance with the correct sound of the word, or according to local pronunciation. This type of error includes such as "larc" and "yung" on the one hand, "weat" and "ad" on the other. The second classification into Unaccountable Errors contains such mistakes as "warg" (young); the third, Other Cases, consists principally of inversions as in "yfl" (fly), and mistakes due to a lapse of attention as in writing "m" for "n," "l" for "b," or omitting final (sounded) letters.

TABLE B (STANDARD I).

Analysis of Spelling Errors.

SCHOOL ...	X	Y	Z
Phonetically spelled—			
(*a*) Correct pronunciation	35·9	31·7	40·9
(*b*) Local ,,	15·8	18·7	20·4
Unaccountable Errors ...	11·1	17·5	7·8
Other Cases	37·2	32·1	30·9

The important part played by phonetics is at once noticeable. In each class from fifty to sixty per cent. of the words spelt wrongly were written in accordance with their sound values. The peculiarity of the results, however, lies in the fact that at Z, where letter sounds are not the basis of the early reading lessons, we have the highest percentage of words spelt on phonic analogies. The children have arrived at the phonic analysis of words almost unaided, and seem to rely upon it more than children of the same standing in other schools where synthetic methods of teaching reading are the rule. A better illustration of the innate analytic disposition of the human mind could hardly be advanced. Again, 94·2 per cent. of the words spelt wrongly by the children at Z, when examined, can be traced definitely to one or more of the causes of error detailed in Table D, as against 88·9 per cent. for X, and 82·5 per cent. for Y.

Table C gives the result of a detailed examination of each mistake made, with the object of tracing the various sources of error.* The total number of mistakes is of course greater than the total number of words wrong, even when unaccountable mistakes are subtracted, since many words contained more than one mistake. For example, "evry" contains only one mistake, "larcke" two, and "wete" three.

TABLE C (STANDARD I).

Analysis of Mistakes.

SCHOOL ...	X	Y	Z
No. of papers examined	40	41	100
No. of words accounted for ...	208	198	569
Total No. of mistakes	257	223	735
No. of words with one mistake ...	163	174	421
,, ,, two mistakes ...	41	23	130
,, ,, three ,, ...	4	1	18

This Table shows that the children at Z had the smallest percentage of words with only one mistake (57·3), as compared with 78·0 per cent. at Y, and 63·4 per cent. at X. The apparently lower average mistake at X and Y is entirely due to the larger number of "unaccountable" mistakes there, which considerably lowered the total number of words to be examined.

The complete details of mistakes are given in the following Table. The percentages are reckoned on the total number of mistakes (see Table C).

TABLE D (STANDARD I).

Details of Spelling Errors.

SCHOOL ...	X	Y	Z
Omission of letters—			
(*a*) Silent letters	28·0	34·9	28·7
(*b*) Sounded ,, ...	8·6	6·3	10·0
Insertion of letters—			
(*a*) Silent letters	29·9	21·6	18·9
(*b*) Sounded ,, ...	3·5	·9	2·1
Total error due to silent letters ...	57·9	56·5	47·6
Confusion of vowels—			
(1) a, e, i, o, u	3·9	13·4	9·1
(2) ei, ie, ea, ee	4·0	3·1	10·0
(3) y, i	3·8	2·1	4·4
Total error due to confusion of vowels	11·7	18·6	23·5
Inversions...	10·5	7·2	5·0
Other cases	7·8	10·5	11·8

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* The rejected papers are not included in the examination.

This analysis of errors shows that the greatest trouble comes from silent letters. There is a striking resemblance in the three returns for this, the commonest cause of error. The silent letter difficulty tells in two ways: the silent letter is often omitted, and the fact that such anomalies exist leads to their irregular insertion on the model of some other word, e.g., "fielde" or "wheate." The total errors due to silent letters suggest that the children at Z are less liable to this type of mistake. They really do rely more on pictures of words after all than the children at X and Y. There is much less confusion of vowels at X than at Y or Z, but in the case of inserted letters and inversions of letters, this order is reversed, the figures being least for Z and greatest for X. This result is not unexpected, for both at X and Y word-building is taught. First a root-sound is taken, e.g., "ay," and with this as basis, other words are built, thus, "way," "pay," &c. But by this means the initial letter of the word occurs last to the child's mind, and when the word is spelt this letter is naturally placed last, resulting in such attempts as "ayw" or "ayp" for the two words exampled above.

The remaining cases consist of the writing of "m" for "n," "l" for "b," and similar mistakes which are perhaps due to temporary lapses of attention, as are also the omissions of final (sounded) letters. Omissions of sounded letters, which are most common at Z, occur chiefly through the writing of "mthr" for "mother," "lrk" for "lark," &c. This shows the extent to which children depend upon visual images of words when spelling. The vowel sounds which are almost entirely responsible for this error are most difficult for the ear to catch, and, in addition, are represented by letters having no striking individuality of form. Consequently, they do not impress either ear or eye so emphatically as consonants do, and for that reason they are often entirely overlooked.

In general, the conclusions to which the investigation gives rise are as follows:—

1. The sentence method of teaching reading produces, in a much shorter time, a spelling efficiency at least equal to that produced by synthetic methods; in equal times, a greater efficiency.
2. Children taught to read by the Sentence method learn incidentally the sounds of letters, and are able to apply these to representing the sounds of words.
3. Whilst these children are liable to fall back upon phonetic analysis, they show a greater faithfulness to the actual forms of words; their mistakes arise chiefly from the confusion of vowel sounds, and the omission of silent letters which are, for the most part, also vowels. They seem less liable to insert silent letters.
4. Letter methods involving word-building are apt to cause children to invert word-forms. This common mistake

amongst young children is smallest amongst those taught reading by Sentence methods ; when it does occur, then it is traceable in the majority of cases to a falling-off in attention to the word actually being spelt.

5. Children taught by letter methods make more "unaccountable" mistakes than Sentence-taught children.
6. Young children have a great tendency to make use of local variations of word-pronunciation.

II.—The Spelling of Older Children.

We may profitably compare these results with those of a similar nature given to Standards VI and VII. Four schools were visited, two being the senior departments of schools X and Z. In each of the three schools, A, B and C, the Sixth and Seventh Standards were tested ; at D only the Sixth, as there was no higher class. The following passage was read to the class, then dictated in phrases as shown, and finally read slowly a third time to admit of punctuation and correction :—

> The principal thoroughfares of a busy city, | or of any town of importance, | are scarcely desirable haunts for the independent traveller. | He is embarrassed by the different traffic. | The terror of the countryman | unaccustomed to the bustle, | is increased by the speed | of the bicycles and motors, | so that he is always in the belief | that he will receive some harm. | Such visitors, often in pairs, | sometimes separately, are to be recognized | by their umbrellas and clothes. | They think that the towns | are full of deceit and dishonour. | It would be interesting to analyse | the feelings of such people | on their first visit from the country to the town. |

The results are tabulated as before, (*a*) to show the average error for each class, (*b*) the percentage of each type of error, and (*c*) a detailed summary of the mistakes made.

TABLE (a).

Class Average Errors.

School ...	A		B		C		D
Standard ...	VII	VI	VII	VI	VII	VI	VI
No. of children tested ...	51	45	22	45	16	13	38
No. of words wrong	264	381	125	355	87	98	300
Average class error	5·2	8·5	5·7	7·9	5·4	7·5	7·9
Mean Variation of Error ...	3·3	4·2	2·5	3·2	3	3·2	3·8

These results show in the first place a singular uniformity, although the schools in which the tests were undertaken differ in size and in the character of the localities which they serve. We may also note the marked improvement in the spelling of the Seventh Standards, which may be due to the superior average capacity of those who remain for this extra year, though it may also be due to their greater familiarity with word-forms, since no special attention is given to the spelling in any of these schools. The Mean Variation of Error also shows improvement in the higher standards.

As in the case of the infants, the mistakes were collected and tabulated to show the extent to which errors are caused through too strict an adherence to the sound of the word. The same types of mistake are again used, i.e., "spelled phonetically," either correctly or as locally pronounced, &c., and again the percentages are reckoned on the total number of words wrong.

TABLE (b).

Analysis of Errors.

SCHOOL ...	A		B		C		D
STANDARD ...	VII	VI	VII	VI	VII	VI	VI
Phonetically spelled—							
(*a*) Correct pronunciation ...	73·1	70·4	72·8	69·3	70·4	72·4	70·0
(*b*) Local " ...	10·6	13·6	16·8	20·6	9·2	7·1	17·0
Unaccountable errors ...	1·9	4·4	3·2	5·3	12·2	10·3	3·7
Other cases	14·4	11·6	7·2	4·8	8·2	10·2	9·3

This table offers a remarkable series of figures. In all the schools seventy per cent. of the mistakes made were through writing according to the word-sound, whilst another ten per cent. are correctly spelt according to the ordinary child's pronunciation of the words—as in "umbereller," which was a very common error. In connection with this it will be noticed that the figures for mispronunciations are highest in the case of schools B and D. The former is a school in a district just outside the Sheffield city area, drawing upon children of the poorer classes, just bordering on the city, on the one hand, and the village children on the other. The latter school is situated in the centre of the city itself, fringing upon a slum area. Locality or local speech seem, therefore, to affect spelling to some extent, but the details afforded by the present investigation in that respect are not sufficiently comprehensive to warrant any definite conclusion being arrived at.

The analysis of spelling errors given below is no less interesting. It is given in percentages which are based on total errors made. As before, each mistake made was scrutinized, and the errors made in each word collected and tabulated.

TABLE (c).

Details of Spelling Errors.

SCHOOL ...	A	B	C	D
Confusion of vowels—				
(1) a, e, i, o, u	16·6	16·2	23·3	21·8
(2) y, i	13·9	11·0	10·5	8·7
(3) ei, ie, ee, ea	4·9	10·1	6·4	6·4
Total errors due to confusion of vowels	35·4	37·3	40·2	36·9
Omission of silent letters—				
(1) In double letters (ll) ...	15·3	12·8	16·5	9·8
(2) „ single „ ...	15·5	14·6	12·5	16·2
Insertion of silent letters ...	8·3	9·6	9·6	16·4
Total error due to silent letters..	39·1	37·0	38·6	42·4
er, -or, -ow, -ar,- -a	7·3	5·6	4·4	6·1
-ant, -ent	4·9	4·3	5·2	2·1
-le, al, -el	3·8	4·3	2·8	3·6
s, c, sc	3·2	4·2	4·0	2·8
s, z	1·9	2·2	1·6	2·1
-air, are...	1·9	3·3	1·6	2·5
Other causes	2·5	1·8	1·6	1·5

Once more the results are very even. The more important causes of error are in exactly the same order for each school, confused vowel sounds and silent letters being the most conspicuous causes of error. At the bottom of the Table there is so small a difference between the various percentages, as to render the minor causes of error equal in importance. Silent letters as a whole, i.e., including omissions and insertions, once more prove a stumbling-block to the child. Such mistakes are largely accounted for by the strong tendency, as shown in Table (B), amongst these upper class children to spell phonetically, and thus omit the silent letters as unsounded; or on the other hand, to insert them in an attempt to spell according to analogy.

III.—A Comparison of the Spelling of Infant and Upper Class Children.

Comparing the results for infant and older children, we find first a singular evenness. The class averages for the same standards are curiously alike; the order of types of errors and their causes is practically the same again, whilst there is also the same tendency towards phonetic spelling. This tendency, however, it must be noted, increases greatly during the interval between the first and sixth standards, being, of course, the natural outcome of mental development. The younger children are less familiar with the standard pronunciation of words; they tend to spell in the way of their own speech. To them, again, the silent letters present great difficulties;

their attempts to spell according to rule are reflected in the number of silent letters which were inserted, a number much greater than that given by the older children, to whom confusion of vowels is the greatest source of error.

On the whole, the results seemed to be an appeal from the children for a more sensible spelling system; or, failing that, a greater attention to spelling itself than is afforded by the purely incidental methods now in vogue in the majority of schools. In support of this statement, some of the conclusions of Dr. Wallin* might be mentioned. They are based on experimental work carried out in a large number of schools, in order to compare the results of formal and incidental methods as applied to spelling. He concludes:—

1. Spelling efficiency is a function of spelling method more than of any other factor.
2. "Drill" is an effective remedy for poor spelling.
3. Incidental teaching should be used to supplement "drill."
4. Increased ability to spell, as a result of "drill" methods, is transferred to other lessons of which spelling is a part.

Those schools which adopted a system of learning a limited number of "spellings" each day, keeping their scholars interested by means of inter-class-and-school contests at certain intervals, soon showed a decided improvement in spelling efficiency, which was reflected in every subject of which spelling formed a part. The investigation has shown the absence of a sound system of teaching spelling to be one of the causes of the present poor spelling complained of by business men and teachers alike.

One of the commonest arguments used against advocates of Sentence methods of teaching reading is that even though the method may produce better practical results as far as reading ability is concerned, than synthetic methods, yet its value in that respect is nullified by its failure to teach children to spell at the same time. The present investigation has shown that such is not the case. Sentence methods of teaching reading produce children who are able to spell at least equally well, if not better than, children taught to read synthetically. Further, they are able to apply their knowledge of letter-sounds obtained incidentally, to cases of difficulty, as has been shown. It is possible, therefore, for teachers, by improvement in methods of teaching reading, and by the exercise of greater care in their use of language and enunciation, to improve and facilitate the spelling of the children under their care, without rendering the process either a hardship or a drudgery.

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* Spelling Efficiency in Relation to Age, Grade and Sex, and the Question of Transfer.

THE EBBINGHAUS CONJECTURAL METHOD OF EXAMINATION.

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One of the problems which every teacher must face is the grading of his classes. He is anxious to grade his students justly, and wishes to feel that he has done so. If he is convinced that his grades correspond to the average of the grades* sent in by his colleagues for the same students, so much the better, since then he has reasonable assurance that his grades cannot be far wrong. If the examinations are so conducted that the student can, independently of his teacher, estimate his own standing in class, embarrassing interviews, by which no one profits, are avoided. If in addition to revealing the relative standing of the students, the examinations can be made to serve the purpose of integrating the knowledge which has been acquired and also serve as a means for exerting a salutary supervision over the student's habit of studying—well and good.

Where classes are large, the time required to realize even a few of these advantages is so great that the instructor spends the best part of his time and energy grading papers; a task which is of small benefit to him, and still less to his students. It is because the Ebbinghaus conjectural method realizes these ideals and at the same time leaves the teacher a vastly-increased amount of time for self-improvement that the writer feels justified in presenting a quantitative demonstration of the results secured by its use.

The investigation extended over three half-years and involved the individual records of more than three hundred students. In the appropriate places the writer will indicate the number of tests and the number of students concerned in the correlations which have been derived.

To facilitate comparison all standard deviations and probable errors are magnitudes of the same order. This uniformity is secured by setting the average accomplishment of the class equal to 50, no matter what the numerical value may have been in the several tests.

Professor Max Meyer, of the Department of Experimental Psychology, presented all the extracts and devised the particular technique.

The example which follows is a typical specimen of the tests given:

Specimen Test.

A factor determining attention is the (1) of a (2) impression (3) the thoughts (4) the (5) at the moment when the impression was made. (6) which (7) conscious (8) the (9) over which everything (10) may enter. Ordinarily the ticking of a clock remains unnoticed. But let the person think of the clock, or time, and the next click is clearly perceived. In order to notice a weak tone in a complicated chord, or a melody in polyphonic music, it is well to hear the tone or melody first in isolation, and try to keep it in mind until the chord or music is played. A slight difference in the colour of two leaves remains unnoticed ; but if (11) are (12 of a (13) difference just before the (14) are (15) to (16) it (17) at (18) vivid (19) our (20). The puzzle pictures in certain popular magazines would never convey the intended meaning to us if we were not (21) by the (22) to (23) of various (24) which (25) might (26). If we know in what order a lecturer will present his arguments to us, we can pay attention to the lecture much more easily and understand it better.

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* English readers should usually translate this word into "marks."

It is a peculiar fact that vividness of a certain thought or even a class of thoughts is never much prolonged. Other impressions or ideas take the place of those which are now focal. Under the most favourable conditions the same ideas (27). This limited duration of attention is most conspicuous in (28) and is one of the greatest (29) which the (30) has to (31. Repeated orders to be (32) are of (33) value. They tend to call up a general notion of the (34) which is being (35) and thus make it easier for the ideas presented by the teacher to enter consciousness. But the (36) is not (37) because the very thought of being attentive cannot (38) have (39) long (40). It is therefore preferable to take into account the (41) of (42), and in accordance with it, to provide a certain (43) in the ideas presented ; to present the matter in an interesting way.

The students were expected to fill in the blanks with appropriate words, and each blank, correctly filled in, was counted as one. One-half was allowed when the blanks were filled in with words which were incorrect, but which indicated that the student had more than the vaguest notion of the contents of the sentence or paragraph. In the class room, as soon as a student finished his paper he brought it to the desk and placed it on top of the preceding paper. This gave the papers in a temporal series, the bottom paper being the first handed in and the top paper the last. In grading the papers two factors were considered: (1) The number of blanks acceptably filled in ; (2) The time required to do it. Accuracy was considered of greater importance than speed, but where a number of students had filled in the same number of blanks, the student handing in his paper first received the higher rank of this particular group. Such groups were seldom larger than five, usually there were but two or three.

When all papers had been graded, they were rearranged in the order of their excellence. The best paper was marked 1, the second best 2, the poorest paper was marked *n*, depending on the number of

(1) presence
(2) similar
(3) in
(4) of
(5) subject
(6) Impressions
(7) become
(8) prepare
(9) route
(10) related
(11) we
(12) told
(13) colour
(14) leaves
(15) shown
(16) us
(17) becomes
(18) once
(19) in
(20) consciousness
(21) told
(22) wording
(23) think
(24) figures
(25) we
(26) distinguish
(27) recur
(28) school-children
(29) obstacles
(30) teacher
(31) solve
(32) attentive
(33) little
(34) subject
(35) discussed
(36) effect
(37) lasting
(38) itself
(39) a
(40) duration
(41) limitation
(42) attention
(43) variety

students in the section. The papers were returned to the students in the same order, thus keeping them constantly informed as to their standing with respect to the rest of the class. The actual number of blanks filled in is not recorded—but only the different ranks the student holds in the various tests. At the end of the term these ranks are added together and the student having the smallest total rank number is considered the best student. These ranks may then be translated into grades to conform to the systems of the various schools. The method is very simple and the instructor is at all times able to form a quantitative estimate of the character of work a student is doing. The simplicity of the method has a tendency to prejudice unfavourably instructors who have never tried it. The grading of examination papers given in the ordinary question and answer form is at best an unsatisfactory task unless much time is devoted to the careful scrutiny of every paper. Even then the instructor cannot escape the feeling that perhaps he has done someone an injustice. Since the question and answer method is unreliable unless much time is devoted to grading the papers, an instructor is unconsciously disposed to believe that the conjectural method, requiring considerably less time and effort, is still more unreliable. This, the writer hopes to show, is not the case.

Variations in the Difficulty of the several Tests.

To determine the difference between the tests, each test was allowed a value of 100. If a test contained 20 blanks, the value of each blank was calculated to be $\frac{100}{20}$ or 5. The grade of a student filling in all blanks correctly would be 20 × 5 or 100. If only 12 blanks were filled in, the grade would be 12 × 5, or 60. In the statistics the element of time was not considered.

The average grade of all the students participating in the test was then taken as a measure of the difficulty of the test. It will not be necessary to give the figures for all the tests that were given, but the series which follows shows the averages of a typical class of 51 students.

40·8 43·4 51·0 51·8 55·5 56·7 56·8 57·0 58·8

Considering all the tests given, the range was from 26·5 to 83·0. This means that some tests were more than three times as difficult as others. While this seems to be a large variation there is no reason for supposing that it is peculiar to the conjectural method, or unparalleled by the ordinary question and answer method. An attempt to estimate the difficulty of a question with only personal opinion as a guide, is usually not accompanied by a feeling of conviction vivid enough to encourage the belief that such a subjective estimate is really accurate. Where variations in the difficulty of ordinary tests become apparent, one is at a loss to determine how much of this is due to the personal equation. I have therefore restricted my interpretations of the data to such considerations as could be objectively determined by an examination of the test papers. When a test is called difficult this means only that the average grade of the whole class is low. If a particular blank is spoken of as difficult, this means that relatively few students filled it in correctly. From what is to follow I hope to show that instead of being more variable, the conjectural method merely shows up these variations more distinctly.

Variations in the Difficulty of the several Blanks.

In grading the tests it was assumed that each blank was equal in difficulty to every other. In order to determine the extent to which the different blanks varied in difficulty, the test papers were inspected with a view to ascertaining to what extent some blanks were more frequently filled in than others. Then, instead of allowing one unit for each blank correctly filled in, the different blanks were given different values depending on the number of students who filled them in. Roughly speaking, those blanks that nearly every student filled in were given proportionately low values, and those blanks filled in by few students were given proportionately high values.

Using this method, we find that some of the blanks were filled in by only 18% of the students, while other blanks were filled in by 90%. If we assume the degree of difficulty is inversely proportional to the number of students who filled in a particular blank, some blanks are five times as difficult as others. In other words, a student who filled in only two of the difficult blanks, should receive about the same grade as one who filled in nine of the easier ones. If two blanks may be equal to nine blanks it would seem as if the method of allowing all blanks the same value is radically wrong. In order to ascertain the extent of error, this test was regarded according to the differentiated blank values. By doing this we should, of course, secure a different set of figures which would express the grades of the students, but if a student's position in the class is the same for one method as it is for the other, then one method is as good as the other, and we are free to choose the simpler. The extent of correlation between the two methods in a test given to 161 students was found to be ·92 with a P.E. of ·006. Since this leaves the position of the students practically unaltered, there is no necessity for using the more cumbersome method of graded or differentiated blanks.

An uncritical glance at the blanks of a conjectural test is very likely to lead to the conclusion that filling in any one of them is largely a haphazard occurrence, a matter of "luck" as it were. If this were the case we should expect all blanks to be filled in about the same number of times. We should expect some students to fill in some blanks and other students different blanks, irrespective of whether they filled in many or few. This was not found to be the case. Those students who filled in relatively few blanks, the poorer students, filled in only those blanks most frequently filled in. They did not fill in those which were difficult. The difficult blanks were filled in only by those students who also filled in a relatively large percentage of the other blanks.

To express this quantitatively, if filling in the blanks is a matter of luck, we should expect a correlation of zero when the grades secured from allowing all the blanks the same value are correlated with the grades secured from allowing the blanks differentiated values depending on the number of students who filled them in. If supplying the appropriate word is not a matter of luck—if it depends upon a comprehension of the subject, we should expect a high positive correlation. The degree of correlation actually found was ·92, as high a positive correlation as could reasonably be expected.

This is one of the strongest arguments to support the contention that the conjectural method is not essentially different from any other method of testing which depends upon comprehension rather than mere memory of the subject matter.

Comparison of the Conjectural with the Question and Answer Method.

In order to determine how closely the grades secured by the conjectural method corresponded to those secured by the conventional method of giving the class a number of questions and having them write out the answers, the correlation was calculated between one conjectural test and one question and answer test, and then as a control the correlation between the two conjectural tests immediately following, both pairs of tests being, of course, given to the same students.

Method.	Std. Dev.	P.E.	No. of Tests.	No. of Students.	Correlation.	P.E.
Conjectural	24·2	1·62	1	49	·34	·079
Question and Answer	16·7	1·14	1	49		
Conjectural	16·4	1·16	1	45	·36	·079
Conjectural	18·6	1·32	1	43		

From the similarity of these correlations it does not seem as if the conjectural method tests a form of ability essentially different in nature from that required in writing out the answers to a question. The rather low degree of correlation is due to the fact that only single tests were taken. Where the average of a number of tests is taken the correlation is much higher. By taking the data from the Department of Chemistry, in which larger classes are found, the degree of correlation reaches the magnitude usually found when mental traits are compared. The average of 25 conjectural tests were taken and correlated with the final question and answer examination. This final examination was a two-hour examination, and covered the work of the term. It was prepared more carefully than the short conjectural tests, and the students also devoted more time to its preparation. It therefore represents more nearly the actual ability of the various students in the subject of chemistry than does any of the conjectural tests which were given during the term. There were two sections of 80 students each.

Method.	Std. Dev.	P.E.	No. of Tests.	No. of Students.	Correlation.	P.E.
Conjectural	12·5	·65	25	80	·69	·033
Question and Answer	20·6	1·10	1	80		
Conjectural	10·9	·57	25	80	·63	·038
Question and Answer	19·7	1·07	1	80		

For the purpose of comparison, the class work of these same students was correlated with their laboratory grades.

Method.	Std. Dev.	P.E.	No. of Students.	Correlation.	P.E.
Class Work	14·2	·78	79	·59	·043
Laboratory	8·1	·31	79		
Class Work	13·7	·45	80	·71	·030
Laboratory	6·9	·37	80		

As will be seen, there is nothing characteristic in the data which will indisputably reveal the nature of the examination method used. The correlation between the conjectural tests and the question and answer examination, might very well represent the correlation between the class work and the laboratory grades.

There is another way of comparing the conjectural with the question and answer method. The grades handed in to the registrar by the Department of Experimental Psychology were compared with the grades handed in by the other instructors for these same students. The correlation between the grades received in psychology and the average of the grades received by these students in their other courses in different departments was ·63, P.E. ·033. Out of 104 students there were only four reversals—cases in which the grades awarded in psychology were on the other side of the mean than the grades awarded in the other courses. Where the products of the deviations of 100 students gives only four minus quantities, and these relatively small, there seems no justification for the assertion, which is sometimes made, that the conjectural method tests only a special ability—such as mere memory—unless we assume that all the other methods of examining at the University are doing the same thing.

The same thing was done for the Department of Chemistry, and while here the grade of the student was not entirely determined by the conjectural method, at least one-half of the information which went to make up a student's grade was secured by the conjectural method. The grades in chemistry as compared with the grades of the same students in other subjects, shows a correlation of ·60 for one section of the class and ·63 for the other.

Another way in which the question of "mere memory work" can be tested: One of the tests was taken from a psychological text book which, undoubtedly, none of the students had ever seen, and the wording of which was different from that in the text they were using. There can be no question of memory work here, because the students had never seen the book.

Source of Test.	Section.	No. of Students.	Std. Dev.	P.E.	Correlation	P.E.
Unknown	8	49	30	2·04	·60	·059
Ordinary Text Book	8	49	24	1·70		
Unknown	11	54	28	1·80	·53	·057
Ordinary Text Book	11	54	24	1·60		
Unknown	2	57	30	1·91	·51	·059
Ordinary Text Book	2	57	22	1·42		

For purposes of comparison we will take two conjectural tests taken from the text book the students were using, and with which they were supposed to be familiar. If "memory work" is a stronger factor in the conjectural methods than in other methods, we should expect these correlations to show it.

Source of Test.	Section.	No. of Students.	Std. Dev.	P.E.	Correlation.	P.E.
Text	8	54	28	1·86	·54	·058
,,	8	54	30	1·97		
,,	11	57	28	1·80	·60	·056
,,	11	57	28	1·80		
,,	2	56	30	1·93	·53	·057
,,	2	56	30	1·93		

Here again the correlations are practically identical. Even where word memory is excluded as in this case, and the students are entirely dependent upon their comprehension of the subject, no essential difference in the configuration of the test results is found.

Finally the effect of mere memory of words was investigated in yet another way. A test was given in which a number of the blanks called for the same word. Now if one of these blanks were filled in correctly, we can no longer say that the other blanks calling for the same word were left blank because the student had forgotten the word. The correct word had already been used. In this case the whole test was given a value of 100. The various blanks again received values depending on the number of students who filled them in, and these values were so selected that where all the blanks had been filled in the sum was 100. By this method the relative difficulty of those blanks requiring the same word can be expressed by the series 1·4, 1·5, 1·6, 1·8, 2·0, 2·1, 2·4, 4·8, 5·7, 10·3. The range is from 1·4 to 10·3, or we might say that the last blank was found to be seven times as difficult as the first one. Yet the word which belonged to the last blank was the same word the student had already written in some of the other blanks.

To illustrate how such a condition may arise, we might simplify the factors involved by taking a few examples from arithmetic. Suppose we select four equations which require an increasing degree of arithmetical ability for their solution, the answer to each of the four problems being identical. This would be analogous to filling in word blanks in sentences which ranged from contexts which readily suggested the correct word, to contexts which required special training for their comprehension.

$$7 + 6 = 13 \qquad \sqrt{13^2} = 13 \qquad \sqrt{144} + \sqrt[3]{13^0} = 13 \qquad \sqrt[4]{28561} = 13$$

In these four problems the answer is in each case 13. That 13 is the correct answer to the first problem is evident to any 10-year-old child. The second requires a little more training. The third still more, while perhaps no one could by mere inspection tell that the fourth root of 28561 is also 13. We have here an instance in which the solutions to a number of problems are all the same, but to determine this fact, various degrees of comprehension are necessary. That is, we must understand the whole equation before we can feel certain that one of its members is correct. Memory of the number 13 does not enter at all. Of course the filling in a blank in a test may not be of such a simple nature, yet in some respects it seems to be similar. This is substantiated by indirect evidence. In grading conjectural tests one frequently finds that synonyms are used, words which were not in the text but which are correct or partly so. A correct synonym can be supplied only when the student fully comprehends the context.

Variability of the different Degrees of Ability.

It is a well-known fact that a grade of 80 given by a teacher inclined to be lenient, may express a lower degree of ability than a grade of 60 given by an instructor more rigorous in his requirements. Again a grade of 80 in an easy test or examination does not represent the same degree of ability as a grade of 80 in a very difficult test. Such ambiguities cannot be avoided as long as the subjective estimate of the instructor is the predominant factor in estimating ability, or as long as all tests are assumed to be equal in difficulty, and actual, rather than relative, accomplishment is taken as the basis. If an easy test is assigned a value of 100, a difficult test should receive a greater value. For the instructor to attempt to evaluate the difficulty of the various tests is, however, impracticable. Some objective measure is much more satisfactory. Such an objective measure is used when the accomplishment of the class as a whole is given the value of 100, and the various students given grades depending upon the percentage of the whole which they accomplish. This practice eliminates the personal equation of the teacher and the error due to variations in the difficulty of the several tests. The method has the disadvantage that it obscures the true variability. A better method is to grade not on the basis of *total* accomplishment but on the basis of *average* accomplishment. This has the further advantage that it is not necessary to perform the tedious addition, because the median may be used in place of the average. If, then, the median is set equal to some constant value (the writer has used

50) any test may be directly compared with any other test. For purposes of statistics all average and standard deviations, together with their probable errors, will be magnitudes of the same order. This method is the one used in this paper, and it assumes that the accomplishment of the average student is less variable than that of the superior and inferior students.* This assumption is justified by the following data.

Two tests were given to 150 students, and the result was divided into three groups: the one-fourth best students; the one-fourth medium students; and the one-fourth poorest students. The standard deviation and the probable error can be read from the table.

	Std. Dev.	P.E.
Best fourth	4·8	·33
Medium fourth	2·9	·23
Poorest fourth	8·5	·68

It will be noted that the least extent of deviation is found in the medium or average group. Next in order is the best fourth, while the poorest fourth has a deviation nearly three times that of the medium group. It would seem from this that the accomplishment of the average student is the least variable factor in this form of mental measurement, and that the average accomplishment is the logical zero point rather than zero accomplishment. To avoid negative grades, and to bring the number series expressing the grades as much as possible within the conventional 1 to 100 series, the writer has decided to call the average accomplishment 50 rather than 1.

The extent to which a single test indicates the Scholarship of a student.

The question often arises, how many tests should be given in order that the relative standing of the students might be indicated with sufficient accuracy for the purpose of awarding grades. This question is best approached by finding the correlation between a single pair of tests. This will show the extent to which a single test may be relied upon to show what place a student holds in his class. About 25 tests were compared in this way, and the correlation between any two tests ranged from ·30 to ·70.

In most schools and colleges five different grades of scholarship are recognized (A, B, C, D, E), and where this is the case a single test or examination would mean that from one-sixth to one-third of the class had received grades which would have been different had the average of two tests been taken. This seems to show that a single test is not very

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* The formula expressing the operation:—

$$G = \frac{50n}{m}$$

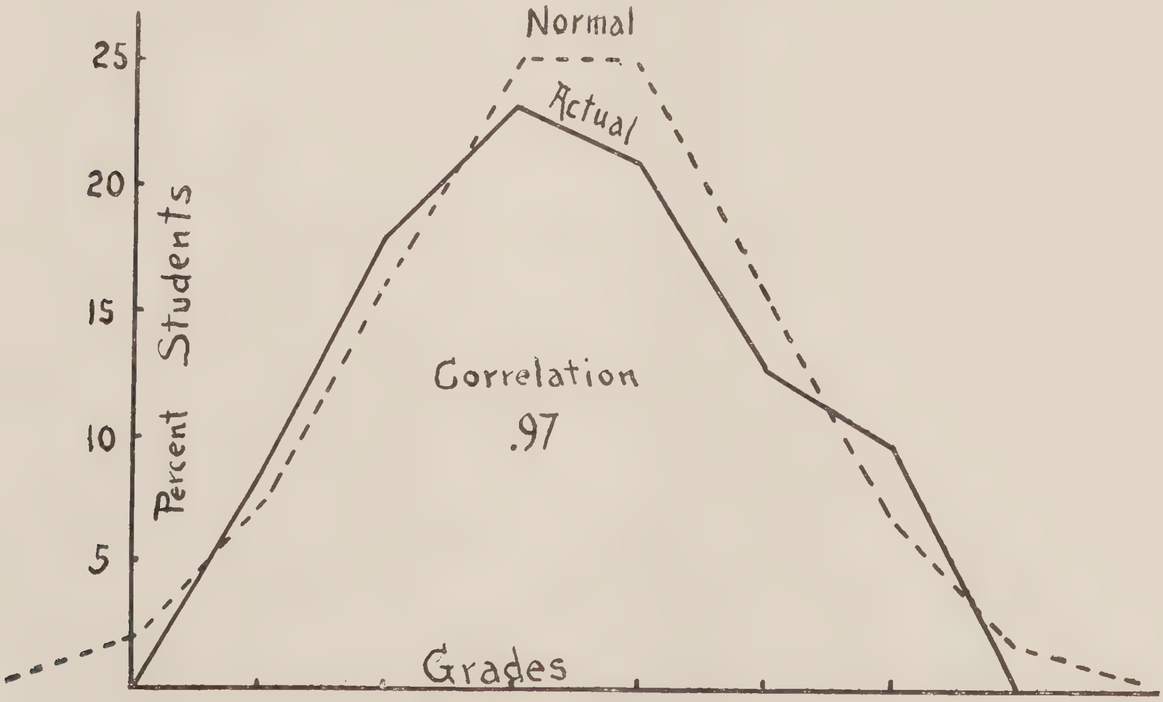
G = grade of student.
n = number of units the student accomplished.
m = median or average of the class.

reliable. To give the various combinations in which two, three, four or more tests were correlated, would take up more space than the uncertain nature of the results justify. So much depends upon the nature of the test and the method of grading. As a matter of opinion only, the writer believes at least five tests are necessary to establish a student's grade with a sufficient degree of accuracy to satisfy the conscience of a none too sensitive teacher and meet the demands of the school authorities. When a student's grade is based on ten tests, it is practically the same as when based on fifteen. For the purpose of establishing a student's grade it is the writer's opinion that seven twenty-minute tests are sufficient. Where the supervisory effects of the test are an important factor, any desired number may be given, but where more than ten are given the length can be reduced to ten minutes, and the disciplinary value not impaired. This element of the conjectural method is used in the large chemistry classes here, where as many as 25 tests are given in one semester (half year).

It is, perhaps, unnecessary to add that such supplementary criteria as oral recitation, laboratory work, reports, themes, &c., act in the same way as an increase in the number of tests.

Comparison between the Actual and the Normal distribution.

Without reviewing the properties of the normal curve, it is perhaps sufficient to recall that it is the bell-shaped curve which represents, for example, the distribution of stature in a population. I have superimposed the two curves. The heavy line shows the distribution as actually found, while the dotted line shows what we should have expected under a normal distribution. The extent of correlation is ·97. The actual curve shows the effect of a single test given to 161 students. For smaller classes the correlation is not so high, but the lowest correlation found was ·88, while usually it was above ·90. For the classes



in chemistry it was ·96. Where the average of a number of tests is taken, the approximation to the normal curve is high, and is quite evident even for relatively small classes, say 25. Where only one test is taken, either the number of students must be quite large, say over 50, or the grading must be refined to a greater extent than is usual.

A fact which is sometimes overlooked when trying to estimate the extent to which a given series of grades approaches the normal distribution, is that there is an indeterminate number of normal curves; also, a normal curve is only symmetrical when the mean happens to fall at the beginning of a class division. This is not the case in an examination as usually given. To merely arrange the material into convenient classes, and then conclude there is no normal distribution just because the curve secured does not resemble the conventional bell-shaped curve, is unsafe. Attention must be given to the variability of the group. The extent to which a series of grades approaches a normal type of distribution can only be satisfactorily determined when they have been compared with the corresponding values of the normal probability integral.

Supplementary Remarks.

As to the range of subject matter which can be tested by the conjectural method, this depends largely upon the ingenuity of the instructor. At the University of Missouri it is now being used, either exclusively or in part, in the departments of Experimental and Educational Psychology, Chemistry and Zoology. Professor Karapetoff, of the School of Engineering at Cornell University, has expressed himself as well pleased with the method as used in his classes in Electrical Engineering. The flexibility of the method could scarcely be better demonstrated. The method seems best adapted to the large classes in the introductory courses of the natural and social sciences, where emphasis is placed on a general rather than a specific knowledge. In a general course in a science such as physics, having a vast body of material with which it is expected to make the student familiar, there is not time to do justice to the quantitative aspect. The instruction is therefore qualitative rather than quantitative. If the tests given are mainly algebraic problems, this qualitative aspect is somewhat neglected. A serious study of any science must, of course, be centred around its quantitative phases, yet that class of knowledge which we describe as general is principally qualitative. Its aim is to show the great variety of natural phenomena, and at the same time indicate the unity which underlies it.

One criticism that has been urged against the conjectural method is, that it eliminates one of the sources of training in English composition. But the rhetorical features of coherence, emphasis and unity in sentences are not expected to reach their maximum effectiveness in an examination. Effective expression in the sense in which we should expect it to manifest itself in an examination, is largely a matter of selecting the proper words. This element is not eliminated by the conjectural method. One may expect idioms peculiar to the subject matter of the examination to be used, and where these are given it is reasonable to assume that the student has prepared his lesson. The conjectural method offers opportunity for a form of training in language which is practically neglected by the ordinary method of examination. This is a training in the reading of English. To fill in a blank intelligently, a student must know exactly what the sentence means. It is a fact of common experience that unless an examination question is stated in the very simplest language, many of the class will misinterpret it. This tendency is exhibited very clearly in the test papers of the conjectural method. It frequently happens that a student will flatly contradict a statement made in one sentence, by the sentence following, thus indicating that he had little idea of what he was reading. It is a matter of surprise to one correcting conjectural tests how prevalent is the inability to understand what is read, and the training which this method gives in discriminative reading, is one of its greatest advantages.

The nature of the conjectural test is such that it requires a definite answer to a definite question. It can be so constructed that unless a student has prepared for this particular phase of the subject he cannot fill in the blanks correctly, no matter how wide his range of general information may be. Nor can a student utilize those questions which he cannot answer as stepping stones to lead on to subject matter with which he is familiar, but which has not been called for in the examination. During the few days preceding the final examination a student may "cram up" on a few of the salient points in a course. It is likely that some of the questions asked will involve the material upon which he has "crammed." Some will not, but since it is not likely that all of the "crammed" information will be exhausted, he will use the other questions to lead up to the residue which remains. Of course an instructor usually sees this, but if the student expresses himself well, and if his penmanship is good, these vicarious answers will not be evaluated at zero as they deserve. "He will get a little something for his good intentions." This ambiguity in the grading process is entirely eliminated in the conjectural method. Either the student knows the correct word, or any of its synonyms, or he does not; the fact that he knows many other words, both longer and in sound more euphonious, will not be counted as proving his knowledge of a particular subject.

It is perhaps unnecessary to refer to the disciplinary value of frequent tests. A premium is placed upon consistent work throughout the year. Cramming is practically abolished, and since a student's grade is the average of a relatively large number of tests, the grade finally handed in to the registrar represents more nearly the actual ability of the student. Any device which insists upon persistent study increases the probability that the various courses will be inter-related. Spasmodic study tends to isolate a particular subject. The ordinary activities of life are insufficient to recall what has been learned in college, simply because the learning was done under special conditions which do not exist when the student leaves the University and enters upon life, where examination is a continuous process.

The conjectural method makes it possible to give large classes frequent tests, and the grading of the papers can be left to assistants, with a reasonable assurance that no great amount of injustice will be done. To grade 100 papers of 15 blanks should not require more than 2½ hours, and after some practice this time is reduced. A fair test is one in which every student scores, but which is yet difficult enough to prevent the best student from filling all the blanks. This will give the desired range to the grades. For short tests 15 to 20 blanks are sufficient, and a test of this length may be given during the last ten minutes of the hour and the students dismissed as they finish. For a final examination, or where only a few tests are given, one in which 50 words have been omitted should not require more than 45 minutes for the students, and will not require more than six hours for grading 100 papers.

The preparation of the text for conjectural tests is a simple process. A method which has proved successful in chemistry is to give as part of the test the names of the chemical substances to be studied, and let the student supply the symbols or formulae. A description of the preparation of some chemical substance in which significant words have been omitted will answer very well. A form of conjectural test which lends itself well to the biological sciences is to present a drawing to the student and have him label and orient the various organs and details. Extracts may be taken from the literature at large, or where a text book is used one or more paragraphs may be selected from it. The source or nature of the material does not influence the relative standing of the students to a larger degree than would result from the inevitable accidental variation. To decide which words are to be omitted is more difficult. In general it may be said that any words which the instructor is likely to select as significant will serve, though at first there is a tendency to make the tests too difficult. After a few tests have been prepared, the instructor learns how to make the test as specific or general as he chooses. It is this element of control which makes the conjectural test so effective in general courses, where the tendency to ramble into irrelevancies vitiates the purpose for which examinations are given.

Where the students are immature, or where the distracting influences of college life tend to divert attention from study, assignments must be specific and the student must be held accountable for this assignment. Unless some method is devised for ascertaining whether a student has prepared the assignment, many students will not spend the requisite time in preparation. This does not necessarily imply a glorification of the text book. On the other hand, before a student can be expected to do independent thinking which is effective, there is a large amount of material which he can get in no other way than by assiduously studying what has been written by other men. Only a relatively small percentage of the human race can be profitably left to their own devices. The majority, especially before the age of maturity has been reached, derive much benefit from intelligent supervision and discipline. While the need for persistent drill is clearly recognized in the elementary schools, when the student enters college it is supposed that he is prepared to assume at once the responsibility for his studies, which, in his preparatory work, was largely left to his parents and teachers. With this sudden attenuation of discipline there is usually associated a novel and distracting change in environment. At best it can only be expected that the student will show personal initiative in those subjects in which he is by inheritance and antecedents especially interested. As long as most of his studies are prescribed, the directing influence must be mostly external.

The conjectural method is a potent factor in realizing this supervision.

Summary.

A student is at all times able to estimate his standing in class.

The various blanks vary much in difficulty, but the relative standing of the students will not be materially changed by allowing all blanks the same value.

The fact that the conjectural method does not test a special ability such as rote memory is shown by :—

(1) The marks handed in by the Departments of Psychology and Chemistry where the method is used, compare as well as could be expected with the marks handed in by the other teachers of the same students where different methods of examination are used.

(2) The correlation between conjectural tests and the question and answer tests, is the same as between conjectural tests only or between class work and laboratory work.

(3) Where the subject matter is taken from a source unknown to the students, the relative standing of the students is the same in the test taken from an unfamiliar source, as it is when the test is taken from the text book the class is using.

(4) Some blanks are not filled in, even though the correct word has already been used.

The marks of the students reduced to terms of the average accomplishment of the class, eliminate the personal equation of the instructor and the ambiguity arising from examinations of varying degrees of difficulty.

The correlation between the marks secured by the conjectural method and the marks expected from the normal curve, corresponds to practical identity.

The conjectural method does not limit the training in effectiveness of expression, and in addition it gives training in the comprehension of what is written.

It rewards consistent work, and penalizes sporadic methods of study.

It saves the time of the student and especially of the instructor, and gives a grade which does not reflect so strongly the effect of accidental variations.

References.

EBBINGHAUS, H. "Ueber eine neue Methode zur Pruefung geistiger Faehigkeiten und ihre Anwendung bei Schulkindern." *Zeitschrift f. Psych. u. Phys. der Sinnesorgane*, Vol. XIII, p. 401.

MEYER, MAX. "Experiences with the grading system at the University of Missouri." *Science*, Vol. XXXIII, p. 661, April 28th, 1911.

WIERSMA, E. "Die Ebbinghaus'sche Combinations Methode." *Zeitsch. f. Psych. u. Phys. der Sinnesorgane.* Vol. XXX, p. 196.

WHIPPLE, G. M. "Manual of Mental and Physical Tests." Article on the Completion Method.

WEISS, A. P. "On Methods of Mental Measurements in Schools and Colleges." *Journal of Educational Psychology*, Vol. II, Dec., 1911.

A SUGGESTIVE SCHOOL.

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[MIXENDEN COUNCIL SCHOOL, HALIFAX. Head Master, K. T. ARROWSMITH.]

"The father who insists on his son holding the board while he drives the nail may drive the nail well, but he who holds the board while his son drives the nail does better. The nail may not be so well driven, but he educates the son. Even so in the schoolroom the child must be permitted to do his own work. Dead time must give place to active endeavour. The child must be a discoverer, an originator, a creator. *He must be permitted to drive the nail.*" [Superintendent Search.]

He *is* "permitted to drive the nail" in Mixenden, a small country school on the hills outside Halifax. The formal external discipline has given way to the self-discipline of the boys and girls. They are "good" in the best and widest sense of the word, because they are "driving the nails." They are working with their hands for a great part of the day, making things of practical use and interest to themselves and their school; and the ordinary school subjects, less, rather than more, differentiated from each other, spring directly from the practical work. The keen, alert attitude and bright intelligence shown, justifies the very large proportion of time given to activities of near and practical interest.

They make the chains with which they go surveying in the fields and roads, and the lanterns to decorate the Christmas trees. The social service to their school takes the practical form of bookbinding and mending, picture-framing, digging over the garden, making a pond and rockery, levelling a plot for the babies' sand, and setting-up bird tables.

On the day of my visit to the school a teacher was away, but the Head Master was in no wise disturbed, and spent time as generously away from that class-room as if she had been there. "The children will work on, and come to me if they want anything," he said, and come they did. "Can I put covers on this book; how?" "How can I fasten this bit of tin to that board." "I can't get my charcoal (to use in drawing later in the day) to come; how is it, Sir?" And an old cocoa tin, with sticks of wood, was examined, and experiments were suggested with, and without, a lid with punctured holes, or, again, varying with a perforated bottom. The gas stove was used freely; no adult, saying "Don't!" "Be careful, now!" was in charge, and the elder children took full responsibility finely.

As the children live long distances away, many stay for the dinner hour, and two or three girls are responsible for the coffee-making. Much hot milk, with a colouring of coffee, helps down the slices of bread the children bring. These girls do their own shopping, keep the accounts, supply the store cupboard; it is no small thing to have hot milk and coffee for 50 children at the same time, having only a couple of small saucepans, a little kettle, and some jugs, but the girls manage well. The clearing-up, to the washing of the kitchen towels, is done, and then the housewives set to work to hectograph the School Magazine. Free intercourse between the upper standards and the infants is arranged in their dinner hour, and big boys and girls show pictures and tell stories delightfully to the little ones. No teacher is on duty anywhere. There is no fine apparatus. The cooking utensils are just the scrap lot that the girls would have to use at home. The materials in the class-rooms for practical work are packing paper from parcels, bits of string, old pails and tubs, broken chairs, rusty iron, tins and bits of leather, tin and cardboard, which have been thrown away somewhere else as "rubbish." Old-fashioned desks have been cleverly adapted into benches for work.

As to the school curriculum, it is fashioned with a very certain aim in view. The school is trying to develop real men and women—"to build up muscular and nervous structure so that capable, clever and keen brains, well-informed minds teeming with initiative will be able to grasp life's problems successfully." The school is to be a "larger home," and so the activities of the school spring readily from this.

Here are a few items taken from the very suggestive and elastic scheme of work:—

Infants have home management by means of doll play. Plays of buying and selling, home activities are represented by following mother's weekly time table. The talk, play, and making things, group themselves on Monday round washing day. Tuesday, mending and ironing; Wednesday, baking; Thursday, shopping; Friday, house cleaning. The sand pile depicts caves, huts, villages, toy cattle, trains, ships, &c.

The home time table is somewhat developed in the Standards. Measure of capacity yields work for Monday, weighing for Wednesday. Plays with dominoes, dice, toys give notions of numbers. Reading, writing is hardly in any evidence until the children are 7 years old, when reading is started by tying printed labels on to objects. The separate sounds is a much later matter. The children often learn to read "quite suddenly."

Children 9½—11 years are in the period for memorizing and drill in the fundamental operations and facts of arithmetic.

Composition is taken in the form of letters from other places, and both here and in the upper Standards correspondence is arranged with neighbouring schools frequently.

In Standards III, IV. The sources of various materials in the home and near environment are considered—dolls' clothes, kitchen utensils, cleaning, cooking, &c. Drawing follows the modelling of objects. The boys make toys and games while the girls are busy in the house. Accounts are kept, purporting to have come from the grocer, draper, &c. The garden yields the consideration of making, and cost of implements needed, measurements of paths and plots, cost of seeds, value of produce. There are school walks over hills, valleys and quarries. The water wheel is looked at, the hand loom compared to the modern mill; England a century ago is pictured.

The boys from 11—14 have special duties, as to the care of hot beds, tool house, frames, &c., in the garden; each is responsible for his own plot. Accounts are kept of expenditure and receipts from garden in general; a diary is written in note books of the work done. The girls of Standards III, IV are responsible for the flower plots and herb bed. Lessons on soils and weeds are given.

The Nature work includes geography, outdoor journeys, experimental work in garden, indoor experimental work with plants and seeds, weather charts, local geography, ruling maps of district quarries, &c., building materials. A further scheme is being developed for Standards V, VI, VII.

Home Building:—

1. History of Homes. Caves, primitive huts, tree dwellings.
2. Modern Homes. Choice of site, shelter, sunny side of hills, prevailing winds, drainage, clay, sand, soil, rivers, elevation, hygiene, railway and train facilities, nearest towns.

3. Rough outline plan of house, size of rooms, arrangement of rooms, light, sun, air space, convenience, calculations, hygiene.
4. Ground plan to scale of house, yard, garden, paths, &c.
5. First floor, plan to scale, bedrooms, bathroom.
6. Elevation of house. Front, back, sides.
7. Height of walls or palings.
8. Cubic capacity of each room calculated on the amount of air space required by each person.

Building the House:—

9. Materials: Stone, bricks, timber, tiles, slates.

Where obtained, how, railways, routes, modes of transit.

Considerations of cost: Carting, nearest railway station, wages, work of masons, excavators, joiners, plasterers, plumbers, glaziers—taken in the order in which the work of these men is required. Ready Reckoners in the form of graphs are used to calculate wages and cost of material. The house is now built.

10. Decorations. Where material comes from.

Outside: Painting and tarring. Cost, wages, amount of space covered, &c.

Inside: Painting, whitewashing, colouring, papering. Cost, wages, time, amount of space covered.

11. Cleaning. Cost of material, time, wages.
12. Floor covering. Carpet, oilcloths, rugs, size and prices.
13. Furniture, including household utensils; scullery, kitchen, living-room, front room, bedrooms, bathrooms, pots, crockery, table linen, knives, forks, &c.
14. Family. Father, mother, three children.
    - (*a*) Income.
    - (*b*) Upkeep of family. Food, cookery, clothes, holidays, medical, recreation, housekeeping allowance (to be reckoned in 24th).
    - (*c*) Upkeep of house. Coal, gas, rent, rates, taxes.
    - (*d*) Simple household accounts. Book-keeping, banking, interest, post office, annuities, insurance.
16. Civics. Municipal Government, National Government, Colonial Government.

I saw part of this scheme worked out. The children had each drawn their ideal house, and the class considered the advantages of each, and adopted the best for future use. The estimates for papering, &c., were worked out clearly on the opposite page. The children looked up in railway guides, store lists, &c., the information they wanted, as the need arose.

The children are from a poor mining district, and I could not help feeling that perhaps they needed some further widening interests and expanding vision than that which continually circled round the house—

even though it may be a worthier one than their own, for man does not live by bread alone. The house scheme, too, is only on paper.

There is a fine sense of progress, a joy in the later unifying of things which may have come as isolated experience. I do not know how far this can be definitely achieved by such a complete "house scheme."

The Literature includes from five to ten minutes every day for the reading of poetry. The folk stories and songs are becoming known and loved by the children. Yorkshire dialect is examined; its history traced. Literature is used historically. Some of the reading centres round the newspaper; stories are dramatized; letters are exchanged. An hour a day is given to quiet reading; some (a small number) of the children ask to go to the workroom instead, but even these are enticed sometimes to the book cupboard to read articles on "things to make." It was good to see children standing against the shelves "dipping" into one or another book as it suited them, before finally settling down to the steady reading of their own choice. Among the books, many bound by themselves, are Chronicles of Schomberg Cotta Family, Masterman Ready, King Solomon's Mines, Ivanhoe, Puck of Pook's Hill, The Talisman, Alice in Wonderland, Stories of Beowulf, Last of the Mohicans, Oliver Twist, Uncle Remus, Child's Garden of Verses, Treasure Island, Uncle Tom's Cabin, Christmas Carol, Tom Brown's School Days, Tales of Odysseus, King of Golden River, Gulliver's Travels, England at the North Pole, General Gordon, Aladdin, Book of Ruskin, Deeds that Won the Empire, The Pathfinder, In the Days of Drake, Jungle Books. The schemes of work are so elastic in principle that *the psychological moment is never lost in order to save the honour of a time table.* But there is method and definite plan throughout. To help the teachers to understand their children, characteristics of the various stages of development are quoted, taken largely from Dr. Stanley Hall, and suggestive lines are given whereby these can be met.

A loan collection of books from the Free Library widens the teachers' reading. On the table I noticed Chamberlain's The Child, Baldwin's Mental Development, Lapage's Feeblemindedness in Children.

The fresh, adventurous spirit of the staff must be good for the children; the relations between them indeed must be mutually happy and helpful, for the children are free and unafraid to show their real selves. The teachers seem to be there, not to enforce matters foreign in interest, but for reference and guidance when necessary, ready to enter wisely and eagerly into the dominant interests of the children they meet every day, and to further enrich them. They "hold the board," and it is not as dull as it sounds, one may watch so many ways of "driving the nail."

It is surely not given for any one individual to achieve the ideal, but here is an interesting attempt towards it.

A SKETCH OF A GIRL'S EDUCATION: A REPLY.

By E. STEEL, M.A.
Warden of the University Hall of Residence for Women, Bangor.

THE article in the last issue of the *Journal of Pedagogy*, entitled "A Sketch of a Girl's Education," must have surprised many readers, and depressed not a few. No responsibility is claimed for the opinions expressed, yet they are submitted to the judgment of any critic who may be attracted by the title; and, moreover, they are submitted as genuine. It is because I too am convinced that the nameless writer has written with conviction, and that his sentiments are real, that I am tempted to reply.

The essay may be divided into two parts: the first, an attempt to portray the ideal woman; the second, an exposition of the best methods of producing the qualities portrayed. The definition of woman is arrived at by carefully contrasting her with man. Her education is shown to consist in the cultivation of charm. This is the quality needed by her above all others, the one peculiar to her as woman.

Before examining the article further, I should like to say that I write, not to champion a sex, but to expose what seems to me a wrong estimate of woman, her sphere, and her power of development. As I am convinced of the writer's genuine desire to explain woman, as he sees her, so I am certain of my own equally strong desire to show her something other than he draws her, and to plead for her education on lines fundamentally different from those he lays down.

A few words must be said first on education itself. We are told, to begin with, that the aim of education is "to fashion and mould a pupil in the image of an ideal conceived with sufficient clearness and held with conviction." Is this really the case? As educationalists are we required to assure ourselves definitely of the excellence of a type, and then shape and twist all forms to it? Are all women, whatever the claims of individuality, whatever their endowments, to be moulded to one model? The rigid conformity to a preconceived design in education has meant failure in the past, and it will, and must mean failure in the future. Because education, whether the education of man or woman, is concerned with human growth, we ask for a different process, perhaps a humbler one. We can stand near and offer chances of development and roads to learning; we can protect and advise; sometimes we can wonder, and sometimes weep; but no man dare *mould*, and the result none can tell. It may be, however, that we have taken the writer too seriously here, for a page later we find him contradicting his first assertion. "Whether we like what nature is doing for us or not, we shall not throw ourselves into petty and futile conflict with her." It would seem impossible to "fashion or mould" without throwing ourselves into conflict with nature. The two statements are therefore irreconcilable.

When we come to the passages dealing with woman in contrast with man, we are reminded of an expression used by Hazlitt of Charles Lamb: "He tried passages on his palate as an epicure tastes olives." Much the same might be said of the writer of the article. There is a conscious relish of the finely-turned phrase, a real delight in the smooth period and well-balanced sentence. The reader, too, is impressed, and at first gives himself up to the pleasure of the writing. Then he grows uneasy. Is there a little too much polish: the art too obvious and the thought too dim? What are we to make of such a sentence as the following: "For her (the writer is speaking of woman in general) the spiritual expresses itself, if at all, in outward shape, in the garment of flesh, and her pride is the very bloom of idolatry." Is there any meaning behind the carefully-chosen words? If there is, it would be difficult to agree as to their interpretation.

But in spite of sonorous ambiguities, the picture of woman drawn for us is clear enough. Here are some of her characteristics. She is at once "cruel" and "capricious," "timid" and "turbulent," "often religious and sometimes moral;" "rarely killed by kindness, but ready to torture those who are nearest to her and of most account to her." A curious list of qualities to wish to perpetuate! Still more curious if regarded as nature's endowment and not deplored, if they exist at all, as the results of custom, prejudice, and a sadly, limited environment. Again we are told: "Her aim is empire, her hope possession, her weapon charm." And later: "Her empire is man, her possession man, she directs her unfailing weapon against man." Are we to believe this? I for one cannot. I do not believe that woman's empire is man in the sense here described. I do not believe that once captured he is valued as a trophy. Without man woman is rarely complete, and few women do not know this. Some may seek, many perhaps pursue, but never I think to capture as a trophy; and the man is a symbol, if symbol he is, not of empire, but of the married state.

After such a view of women, it is scarcely surprising to find the incomplete and morbid view of marriage which follows. There is no mention of man or woman as the complement of one another; no community of interest is even hinted at. Instead, we are asked to believe that mystery is the keynote of marriage, and the woman must furnish this mystery. Man must worship at her shrine: he must never know her; he does not need her presence constantly; but let him once surprise the mystery and his worship will be gone. I confess to a somewhat impatient contempt for this part of the essay. There is an unhealthy note about it, which at the same time may be thankfully recognized as unreal. That a woman "never yields her heart in marriage," and that "if she does, she is a disappointment," are only examples of the many statements which to all who have known happy marriages must ever appear false.

From the consideration of woman we pass to the methods of her education. Her empire and aim were man; so she must be educated to attract him. Her weapon was charm; this must be cultivated.

To do justice to the writer, it must be said at once that by charm he understands not merely physical charm, but also charm of mind and soul. Very little, certainly, is said about the spiritual training, except that it is to be founded on "mystery and awful wonder," but for the development of charm of mind and body more is suggested. Charm of body receives the first consideration. A girl must be taught to cultivate her physical gifts: she must be healthy, and must study grace of carriage and movement. Only those forms of exercise and games which would be likely to develop grace must be indulged in. No possible consideration of the moral value of games must persuade her to take part in exercise which is inelegant. Grace, not character, is the object to be kept in view. Hockey, then, must never be allowed, the bicycle, if possible, must be abandoned, and only as Nansicaa played ball upon the sea-shore must tennis be attempted. Even a more restricted programme still is offered for the cultivation of charm of mind. A girl must first acquire a pleasing voice; this done, "with understanding and intelligence she must know how to listen;" from books of chivalry and romance she may "form her mind and train her manners." Apparently she requires nothing else; books, other than romantic, she need never consult, all the information she requires will be miraculously gained by intercourse and observation. It is not difficult to concur with the suggestion that she should have opportunities of hearing good music rather than continuously practising it, and see good pictures rather than hear "comment and criticism" upon them. Undoubtedly, too, it is good that she should sew well.

No doubts of the success of such a system rest in the author's mind. So sure indeed is he that he sees the girl trained on romance and taught by observation drawing "conversation in refreshing draughts as from a perennial spring of happy and quiet thought, and limpid, pure observation." We are not so optimistic. Could the comely, colourless echo he has drawn for us indeed *think?* If she could, she has indicated to some extent her right to exist, and we ought to be ready to champion the system that produced her. But let us examine her more closely. In speech, studied; in gesture, conscious; in silence, flattering; a mind whose only training has consisted in the absorption of romantic stories, one untrained by knowledge, untaught to reason. To dress she may be serious, but not to life or learning. Wisdom may unconsciously be absorbed, but there must be no effort to acquire, no desire to understand. Only must the shadow that is to become woman sit, (and sit well,) while cities, manners, men, play their part around her, and the world, that needs must beg existence of her, remains unfathomed and unknown. A horrible picture indeed! a nightmare, where one feels dimly the fetters of an earlier civilization, but wakes perhaps the happier for the knowledge it is past.

Charm may be much to a woman. I don't object to this, though I think it is a quality which should be cultivated in men also. What I do object to is the contention that charm can be taught, and that only that should be taught which could in some way minister to its development. Charm, to be any power, must be unconscious; to work for charm is to work for self-consciousness and pose. Grace of carriage may be obtained by the help of athletics, dancing and gymnastics; hindered by unsuitable clothing, and over-specialization in some particular form of exercise; but it can never be taught by studied entries to a room, or Victorian lessons in deportment. Wisdom cannot be gained by hearsay, nor understanding by talk alone. It is the mistake of the earlier days, the mistake we are tending to fall into again. Because some women with knowledge were ungainly and ungracious, we blame knowledge; because some who were clever were unimaginative where the feelings of others were concerned, we blame knowledge; because some who were learned made bad housewives and negligent mothers (very few), we blame knowledge. And in its place what do we suggest? Superficiality—a specious omniscience. Let them appear to know everything: never mind that they won't know anything very well; let them at least know the names of things. It is the finishing school again, the cunning effort to teach the girl to make the most of the little she knows, and to pretend the rest. This we are told is what men want, this the lesson the girl must learn if she would marry. And if, after such a training, the privilege of marriage be denied her, what then? One million more women in the world trained to charm than men to be charmed! What, under present economic conditions, is to become of this million? Has the world any use for minds so trained? Can a woman so taught, even if she has not to earn her own living, find when she stands alone any purpose in her life, any interest in her days? Too late she learns that she has been seeking the impossible, and, as she failed to attain the reward of education, so she has failed in education itself. Charm is like happiness, it cannot be bought; like happiness, if you set out to seek it you will lose it; if you forget all else in your desire for it, you will never know its meaning.

Give your girl knowledge that she may know something well enough to dread ignorance, and so grow wise; make her strong that she may know how to help, and not only how to please; make her kind and understanding, not because she has lived her days between the pages of romantic literature, but because her life has been real, and not artificial, and in her short day she has seen something of the joys and sorrows of other people. These things will make her honest, these things will make her sincere; and for us, in a world grown old by reason of its shams, these things should have their charm.

DRAMATIC HISTORY & FREE DISCIPLINE.

Class....Standard III. Mixed. In a slum district.
Time....November, 1911.
Teacher....Age 22.
Previous Lesson....Battle of Hastings.

Teacher. "Now, children, you learnt all about William the Conqueror last week. To-day we're going to have a lesson on - - - something called the Feudal System - - - something William the Conqueror invented. (*Boy's hand waves furiously*).

Harry Hawkins. "I know! I know, teacher."

T. (*somewhat anxious*). "What do you know, Harry Hawkins? I haven't told you yet."

H.H. "Please, teacher," (*stuttering with excitement*), "It's a candle with marks on for the hours, and when it burns yer know wot the time is, cos they 'adnt any clocks."

T. (*relieved*). "No, Harry Hawkins, that's quite wrong. You're thinking of Alfred the Great. He was before William the Conqueror. Sit up. (*Looks round.*) Now when a King comes to the throne what do you do?"

Billy Hopkins (*a communicative and interrogative pupil with a marked inability to discriminate between sacred and profane history.*) "We 'as free dinners and 'olidays all the time, teacher."

Gladys Burgess. "Yer crowns 'im with a gold crown wi' jewels a' sparklin' all over."

T. (*benignantly*). "*G-o-od* girl, Gladys Burgess. I see you remember the Coronation. And who was crowned then?"

All. (*Chorus of voices and forest of hands*). "King George, teacher."

1st Boy. "I saw 'im pass in 'is kerridge, teacher. 'e 'adn't a crown on."

2nd Boy. "I saw 'im a lyin' in state in the Abbey."

T. (*rather shocked*). "*No*, Tommy, you must think again. It was a Coronation. King Edward died a year before."

G.B. (*eagerly*). "Please, teacher, I saw 'is children too—the Princess Mary! And she was bowin' and smilin' (*swallows*) and she 'ad curlin', frizzy 'air, and..."

T. "Stop! Children! you're talking over there (*long glare and pause*). No, Gladys, we can't hear any more. I must go on with the Feudal System. Well, now, what do we do when we've crowned the King? Now think." (*Many hands*).

B.H. "Please, teacher, yer oils 'im. The Chief Priest 'e tips paraffin on 'is 'ead."

T. (*startled*). "Paraffin! (*With pitying forbearance*). Oh, you mean, Billy Hopkins, the Archbishop of Canterbury anoints him. Chief Priests, you know, only come in the Bible and not in history lessons; *e-ver* so long ago."

3rd Boy (*reflectively*). "Per'aps there was one left over when William the Conqueror 'e comed to the throne."

T. (*still pitiful*). "But, Billy Hopkins, it was'nt paraffin."

B.H. (*puzzled*). "Yes, teacher. It was all in the newspaper. They oils 'im on the 'ead."

T. "But not with Paraffin Oil."

B.H. (*interested*). "Wot sort was it then, teacher?"

T. (*embarrassed, assumes an impenetrable countenance*). "Does any child know what sort of oil a King is anointed with? (*Pause.*) Nobody know!" (*Long pause, then a solitary hand.*)

2nd Girl (*helpfully*). "Please, teacher, Castor Oil." (*Many hands go up. There is a confused chorus, over which rises "No, teacher, Cod Liver Oil," "No, teacher, Camphorated." "Eucalyptus, teacher."*)

T. (*crossly*), "No, don't be so silly children. (*Pause.*) It was *H*-oly Oil. Now say it altogether." (*They nod their heads in concert as they shout out "H-oly Oil."*)

B.H. (*whose interest exceeds his tact*). "Wot was it made of teacher?"

T. "Now we *must* get on with the lesson. You mustn't call out, Billy Hopkins. Now, silence! Eyes on me! (*Pause, slowly surveys the class*). Now, children, what did the Nobles, all the Earls and Lords do, when King George was crowned? Yes, Rachel Baynes, you."

Rachel Baynes. "They bow down before him, and......"

T. "And...... yes,......what else?"

R.B. "They kisses 'is *h*ands."

T. (*surprised.*) "*Go-od* girl, Rachel Baynes. (*Hand up.*) Yes, Patrick O'Donaghue?"

Patrick O'Donaghue (*communicatively*). "Please, teacher, they kisses Peter's *toe*."

5th Boy (*eagerly*). "O-oh, yes, teacher,—'is toe is all shiney with folks a kissin' it. I seed it in the Cath-edral."

T. "Be quiet, Patrick O'Donaghue, we're not talking about Peter, but King George. Now, why did the Lords kiss his hand?"

Patrick (*thoughtfully*). "So 'as 'e wouldn't 'ave to take 'is boot off" (*Teacher glares and passes on.*)

6th Boy "To show they wasn't 'is enemies."

T. (*doubtfully*). "Well, yes, in a way. Well, I'll tell you. They knelt down one at a time and kissed his hand to show he was their King, and they would always obey him. And, oh, I forgot to tell you, that besides his crown he carried a big stick, covered with jewels, in his hand."

7th Boy (*calling out eagerly*). "To show 'e could beat 'em, teacher, when they did'nt do wot 'e told 'em."

T. "No, Tommy, what an idea! It was to show he was King. Kings always carry sceptres. Now, when William the Conqueror became King (*suddenly darts out a pointed finger*)—Date, Bessie Croal."

Bessie Croal (*jumps in her seat. Pause.*) "1866, teacher."

T. "*G-o-o-d* girl, Bessie. *Qu*ite right. No, Bessie, not *eighteen* six six, when was it? (*B.C. shakes her head*). Well, anybody? You all ought to know. We had it only last lesson. (*Various centuries are suggested, among which occurs 1066.*) Yes, *Ten* sixty six. Well, when William came to the Throne he made a new law that all the land was to be his. Nobody else was to own the least little bit of it."

Freddie Butcher (*thoughtfully*). "Did the people fall into the sea, teacher?"

T. "You're not to interrupt, Freddie Butcher. But of course William could'nt look after all the land himself, so he lent great big pieces of it to the Barons. Some of the pieces had big castles on them—oh, ever so big! But before the Barons could go and live in them they had to go to King William and kneel down and swear....... *I* can see you, Algie Simpson." (*Turns from Algie to see a hand up.*)

7th Boy. "Please, teacher, did they *all* swear?"

T. "Yes, all the Barons."

7th Boy (eagerly). "Please, teacher, wot did they say?"

T. "Well, I'm going to tell you. They call it (*emphatically*) Doing Homage. I'll put it on the Board. D-oing H-omage. Say it altogether. (*The class obeys.*) William the Conqueror put out his hands like this (*suitable action*), and the Baron put his hands inside them and said 'I swear to obey you,' and then kissed him on he cheek."

7th Boy (disappointed). "That aint swearin'."

Freddie Butcher (excitedly). "Yes, it is. It's like 'I swear to tell the truth, the 'ole truth, and nothin' but the truth, so 'elp me God.' My father 'e says that and kisses the Bible."

A girl. "Did they kiss William, teacher, 'cos there was'nt any Bibles?"

Jimmy Carter (piously). Did they worship Idols, teacher?"

T. (irritably). "*Do* be quiet...... You drive me distracted. And don't, for goodness sake, call me 'teacher' every half-second."

J.C. "No, teacher."

T. "Listen to what I've got to say. (*Pause.*) Sit straight there. (*Pause, sees Jimmy's hand up.*) Well, Jimmy, what now?"

J.C. (has been engaged in calculation, and heard nothing of the admonition.) "Please, teacher, there's a hundred and twenty half-seconds in a minute."

T. (stands in silent desperation, then continues). "And then William the Conqueror says to each Baron,—sit up, you there (*this is probably intended for a pupil*)—'You must send me twenty Knights whenever I want to go to war, and, oh yes, you must give me a lot of money when my daughter marries.'"

A girl. "What for, teacher?"

G.B. "Is Princess Mary married, teacher?"

T. (fiercely). "*Will* you be quiet? (*Gives up all idea of further exposition.*) Now, would you like to *play* the Feudal System?"

All (enthusiastic). "Yes, teacher."

T. (with restored confidence). "Very well. We shall want William the Conqueror. Now, who would make a good William the Conqueror? Sammie Smallwood, you've been sitting like a mouse. You come and be William."

B.H. (disappointed). "Please, teacher, Sammie's too small for William the Conqueror. I just knocked 'im over in the playground, and, please, teacher,"......

T. "Stop talking, Billy. Kings aren't always big you know."

B.H. (argumentatively). "Saul was, teacher. 'e was 'ead and shoulders above all the others in 'is stockin' feet."

F.B. (meditatively). "King George, 'e's a little feller."

T. (firmly). "Sammie is King. Come here, Sammie. This shall be your throne. (*Sammie seats himself, blushing.*)

A Girl. "Please, teacher, I'll be Queen."

G.B. "And I'll be Princess Mary, teacher."

T. (crossly). "You *can't* be Princess Mary, Gladys. It's William the Conqueror we're doing. Here now, you shall be his daughter. Now all the rest of you are Barons. Be quick, now, or the bell will ring. Now shall we crown him first. Here, William (*produces triumphantly a gilt paper crown from the desk*), I've made you a crown. Oh, who'll be Archbishop of

Canterbury? Yes, you, Billy Hopkins. Mind you crown him properly. Now, children, come and be Barons. Now, what do *you* do?

Children. "We swears, teacher."

T. "No, not yet. You must shout 'God save the King.' Now are you all ready? (*Pause.*) Begin."

Children (*Chorus*). "God save the King!"

T. "No, how stupid you are. He isn't crowned yet. (*Turns to the throne.*) Now, Archbishop. (*Sees a large drop of ink trickling down William the Conqueror's nose.*) Billy Hopkins!! Whatever are you doing with that ink pot?"

B.H. (*with a look of surprised innocence*). "Please, teacher, I'm oilin' 'im King. (*Showing the ink pot.*) It aint paraffin. It's *H*-oly Oil."

T. "You're a *very* naughty boy! You shan't be the Archbishop any more. Daniel Brown, you come along. (*Goes to her desk.*) Here, one of you, give William the Conqueror this blotting-paper. Now, blot yourself quickly, Sammie Smallwood."

Boy (*consolingly*). "'Twon't show teacher. 'Is 'air's black."

T. "Now, are you ready? (*Pause—Impatiently.*) Well, crown him, Daniel Brown. Don't stand gaping. Put it on straight. Won't it fit? Here, give it me, and I'll nip off a bit up the side. There, now, it'll do. (*The Archbishop crowns him.*) Now, children, wave your hands (*vociferously*) God save the King! (*Children join in.*) Now, *stop*. What do you do next?"

Children. "We swears."

Boy. "He ain't got his sceptre."

T. "No—neither he has. *G-o-o-d* boy, Theodore. Here, Sammie, here's the pointer for you. Now, who is the Chief Baron? Yes, you, Hilda. Come out."

2nd Boy. "She can't be a Baron, teacher. She's a gurl."

Hilda (*indignantly*). "I can be a *Lady* Baron."

T. "Very well, Hilda. But be quick. Now, kneel down, and put out your hands. Where are yours, William? (*The Conqueror's crown is somewhat ricketty.*) Yes, hold his crown on for him, Archbishop. Now, swear. (*Dead silence.*) Go on."

H. "I swear."

T. "Yes, go on."

H. "To obey you—and——"

T. "Yes, go on."

H. "And to pay for your daughter's weddin'."

T. "Yes. Now, the next. Adam Higgs. You. (*A. H. kneels down, and goes through the same ceremony.*) Oh! I forgot. William ought to give the Baron some land. Now, William, what are you going to give him?" (*At this moment a squeal comes from the kneeling Baron.*)

Adam Higgs. "Ugh! teacher—'e's 'urtin' me. 'E's a' squeezin' my chilblains. (*To William the Conqueror.*) 'Ere, I say, stop that! (*He proceeds to thump William on the head. William retaliates with his sceptre. Teacher seizes William by his grey celluloid collar, which bursts apart, shedding the stud on to the floor. The Conqueror's attention is at once diverted from his refractory vassal to recovering his only stud.*) Now, you're too bad. We can't play any more. Here, Adam, stop that noise and go back to your place. (*Looks at his hands pityingly.*) You can't pay homage with those hands. Ask the school nurse to give you some lotion for them next time she comes. Sammie Smallwood, come back to your place."

William the Conqueror (*tragically reproachful, and holding up the two parts of his stud.*) "It's broke, teacher." (*Retires to his place in speechless misery.*)

T. "There's the bell. Go back all of you. We must stop. (*Fiercely.*) Give *me* that pointer, Billy Hopkins,—and stay in five minutes. (*The late Primate of all England retires muttering anathemas.*) Now, children, you won't forget the Feudal System will you? I'll question you on it next week and see how much you remember." C C.G.

REVIEWS AND NOTICES OF BOOKS.

"The School. An Introduction to the Study of Education."

By J. J. Findlay, M.A. 256 pp. Williams & Norgate. 1/- net. (Home University Library).

THE series to which Professor Findlay's book belongs has been called "a sort of encyclopædia written in the missionary spirit." If there is more of the missionary than of the encyclopædia in what Professor Findlay has written about the school, it is due to the nature of the subject and the particular audience he is addressing. All the readers of the Home University Library have been through schools, and they are apt to think of school in terms of their own experience. What a revelation this book will be to them! Here are two hundred and fifty pages written about schools, and the word instruction hardly appears in it. The fact is all the more remarkable when we remember the views of the Herbartians which Professor Findlay himself represented so admirably twelve or fourteen years ago. Perhaps some contrasts between the article on the study of Education in Volume II of the Special Reports on Educational Subjects (1898), which we owe to his pen, and the doctrines of his new book will best bring out his present outlook.

In 1898 he wrote, the student of education "must determine the Aim of Education." Although this is not mainly a teacher's question, it is "a difficult and grave investigation" which will involve "ethics, psychology, and political science" and "some experience of the world." Now we read that the teacher, like all other professional men, "is an actor playing a professional part. When alone or with other adults he can find scope for adult modes of experience, can see the world with larger vision, can drop the schoolmaster and *find relief** in the thoughts and feelings of his contemporaries (the italics are ours). There is no hypocrisy here, although there is restraint; there is submission to convention; for the obligations of his post require that a man who lives among children shall be a child while in their company." To lay upon the school and the teacher excessive and exclusive obligations as regards morals and the training of character "smacks of insincerity." What a wide gulf it is which separates us now from Herbart—"the one and only aim of education is morality." Whilst there is much to commend this simpler view of the teacher's responsibility, has not Professor Findlay overstated his case? Even if the teacher is to accept the "Ethics of the Period," he may be much puzzled as to their nature. They are so indeterminate that a personality based upon them is scarcely conceivable. The doctrine suggests that personality in the teacher is a dangerous asset. The man of strong personality cannot set it aside and become as a child among children. Nor in our experience, are children disposed to accept him on those terms, even if it were desirable. Surely Professor Findlay's fear lest the strong man should interfere with the free development of individuality is the *Reductio ad absurdum* of the temper of mind which calls for undenominational religion in the schools. So fearful are we becoming of the rights of the child, that we are to put on a professional mask and pretend to be what we are not, lest we should inadvertently put a little of ourselves into them. It would indeed be a relief to get out of such an atmosphere into the realities of contemporary life, if it were possible to reduce our art to such a piece of play-acting.

In 1898 again, Professor Findlay's pedagogy gave the place of honour to instruction. Whilst the Child is to be carefully studied, it is "as a being capable of acquiring knowledge and skill," and what we teach him is to be determined "by conclusions derived from the Aim of Education, from the necessities of Administration'' as well as from the child's varying needs. In his newer conception of the school, *experience* takes the place formerly occupied by *instruction*. Schools exist for ''the enlargement of experience.'' Instead of the Subjects of the Curriculum, we have a chapter on ''The Pursuits of the School.'' The difference is, of course, not one of terminology merely; it goes to the root of the matter. The child is the centre of things, and the ''psychological moment'' takes the place of the ''Aim of Education'' and the ''necessities of Administration.''

But in thus contrasting the Professor Findlay of 1898 with that of 1912, we would not be misunderstood. He did great service to English education by his exposition of the Herbartian point of view, and, above all, by his effort to give it practical expression. He has changed his standpoint and accepted the Dewey doctrine with the fervour of an apostle. The result is a book which cannot but affect the whole trend of English school practice. That the biological point of view must sooner or later have a profound influence upon educational practice we should all admit, and this eloquent presentation of the case—in so far as it does not suffer from overstatement—will hasten the day when the present life of the child will be the more important factor in determining our educational procedure than it is at present, The standpoint is, of course, older than Dewey. Pestalozzi affirmed it specifically in contrasting the instruction given by the mother with that by the teacher of his day. ''She takes her start from the child, he takes it from his subject,'' and more generally in his repeated insistence upon the principle ''Life educates.'' It was Herbart's mistaken psychology that led him and us astray, and Professor Dewey is calling us back to the true path. Professor Findlay has written a seminal book which no student of education can afford to neglect. At the time, we think instruction will continue to play a chief part in school life. The ''Follow the Child'' principle has its limits as Edgeworth found out—''My son . . . was not a little disposed to think and act for himself (at nine years of age) . . . . but I found myself entangled in difficulties with regard to his mind and temper. . . . It was difficult to urge him to do anything he did not fancy, and more difficult to restrain him from what he wished to follow.''

J. A. GREEN.

"Broad Lines in Science Teaching." Edited by F. Hodson, Ph.D., B.Sc., with an Introduction by Dr. M. E. Sadler. Demy 8vo., xxxvii + 267 pp. 5/- net. Christophers, London (second edition, 1911).

THIS book adds another to the interesting editions of collected essays on English Secondary Education that have appeared during the last fifty years. Some, for example, Acland & Smith's *Studies in Secondary Education* (1892) and Scott's *What is Secondary Education?* (1899), have been concerned to educate public opinion on the vital questions of the provision and organization of Secondary Schools. Others, like Farrar's *Essays on a Liberal Education* (1867) and Cookson's *Essays on Secondary Education* (1898), have directed attention to important problems of curricula and method, while *The Public Schools from Within* (1906) sought to inform outside opinion and disarm criticism by showing that these institutions are fully alive to their responsibilties. Each of these volumes has been called into being at critical periods in the history of English Secondary Education. The present book differs from any of its predecessors in dealing exclusively with one subject, viz.. science teaching; but it, too, appears at a critical time when the old conflict between human and scientific studies is giving place to a larger view of education, and when, from a variety of causes, a systematic study of methods of teaching has become increasingly important.

The essays deal with the teaching of science to boys and girls of secondary school age. The Editor has tried ''to cover a wide field, to achieve, through variety of the contributors' experience, variety of presentation, and so to convince the reader of the many-sided value of science in modern education.'' To that end, he has collected twenty-one essays, each about 3,000 words in length, and Dr. Sadler has written an admirable introduction. Let it be said at once that although the essays vary in merit, they are, without exception, highly provocative of thought, and well worth reading. They deal with such varied topics as the place of Science in the Curriculum, Biology, ''Research Work,'' School Mathematics in relation to School Science, the place of Hypotheses, the Training of the Affections, Economic and Domestic Science, Tendencies in School Science abroad, to name but a few of the many interesting subjects discussed. But it is, we think, a pity that at least the more obvious errors were not corrected when the second edition was called for. The form of some of the essays suggests that they are fragments of larger wholes. A long introduction is followed by a jerky series of more or less detached propositions, as if the Editor had found it necessary to score out connective tissue very freely. At least one paper (No. III, Nature Study) suffers from a quasi-scientific and quasi-psychological treatment that seems out of place in a book avowedly concerned with the scientific spirit in education. What, we wonder, will the teacher gain from such advice as that in nature work he must not only attend to the general attitude of the child, but also to "any records of the conduct of primitive man to whom the world, too, is new and all"; that early nature work consists in children "simply watching and expressing their impressions informally either to the teacher or to each other"; that these babes under 7 years of age are to attend, among other things "to all details of a heavy shower and a thunderstorm and the effects of both," while children of 10-12 are to represent graphically "the rate of crawl of a snail," so as to detect "any variations due to fatigue, perception of food, &c." The psychology of the same article is hardly more helpful. How can anyone base a working scheme on such wrong conceptions as are implied in statements like the following: "From an attitude of attention and a state of interest there arises the more definite mental states of wonder and curiosity," and what is an "á priori interesting environment"? The English of several of the essays is not above reproach. "The very fact that we have a class or group shows that analysis and selection within the realm of nature has already been made, and generalization and classification has followed, leaving the children to ruminate instead of to browse to their liking."

One of the most striking statements in the book has the authority of Dr. Sadler. He says that though science has found a firm place in our public schools, "scientific method and the spirit of science have not yet influenced the whole of the intellectual life of these institutions: have not yet remodelled the ways of teaching in other than what in the narrow sense of the words are called science subjects." This being so, we may ask whether the book is likely to extend the influence of the spirit of science, and we should expect to find in it a clear answer to such questions as: What is scientific method? What is the scientific spirit? But the first is only partially answered and the second is dealt with by——Dr. Sadler! Besides, the essayists are not always uniform in their use of the term "science," cf. for example, Essays III, VI, VIII and XI.

Whilst we have pressed these points—most of them easily altered—in criticism of the book, it is only because we should like to see its general message more widely accepted. There is so much in it that is stimulating and first-rate that it seems a pity to let it suffer from blemishes that are not always fundamental.

C. BIRCHENOUGH.

"Education in Scotland: A Sketch of the Past and the Present."
By W. J. Gibson, M.A. Longmans, Green & Co. xi + 151 pp. 2/6 net.

To sketch the history of Education in any country in 118 small pages is no light undertaking. Yet this is what Mr. Gibson has done, for the last 33 pages of his book are taken up with a survey of the present condition of things. Of course, such a sketch can do no more than take a very general view of leading features, and this Mr. Gibson has done on the whole successfully, so that his little book ought to be of interest to the young students to whom it is primarily addressed. The earlier part is, in some ways, the easiest to treat generally, and Mr. Gibson has here been most successful. He recognizes that "these so-called barren centuries [i.e., the Middle Ages] were rich in educative influences," though he seems to imagine them more closely confined to the clergy than was actually the case. The account of the seventeenth and eighteenth centuries is somewhat optimistic. The Act of 1696 is spoken of only in connexion with the highlands (p. 77), and the fact that many parishes were without schools in the middle of the eighteenth century is not noted. As the account nears our own times it becomes nearly entirely occupied with changes in administration, where records of actual school work would have been more welcome. But we cannot have everything in little more than a hundred pages, and Mr. Gibson's book may well inspire its readers to push their inquiries further.

J.W.

"Education for Citizenship," By Dr. G. Kerschensteiner. Translated by A. J. Pressland. Introduction by Professor M. E. Sadler. (xx + 133 pp.) G. G. Harrap & Co. 2/6 net.

It is twelve years since this book first appeared in Germany, and although it has been considerably enlarged in the fourth edition, of which this is a translation, the author's main message remains unaltered. The book concerns, in the main, what we have learned to call Continuation Schools, and the fact that Dr. Kerschensteiner, as director of the Public Schools in Munich, has done work which has attracted the attention of every country in Europe, lends enormous weight to his words. As Dr. Sadler, in his happy introduction, puts it, "he (the author) is a thinker who can translate his thought into practice; a doer of things which are the realization of an ideal."

It is a book which should be read by all who are concerned in the further education of those who do not pass from the elementary schools to places of higher education. For them, "public educational opportunities must be provided, which "should relate immediately to the occupation of the individual, and thus, as far as possible, rivet his attention." Space will not allow us to discuss Dr. Kerschensteiner's plans. We may, however, commend the book for the breadth and sanity of its outlook, and for its high ideal of civic life. The author understands his problem largely because he understands young men and women. J.A.G.

"**Chapters from Modern Psychology,**" By James R. Angell. (vii + 308 pp.) Longmans, Green & Co. 6/-.

Professor Angell delivered the first series of lectures on the Ichabod Spencer Foundation at Union College last year, and they are now published by the Trustees. The lectures deal in a popular manner "with the main characteristics of the contemporary situation in psychology," and judged from that standpoint they are admirable. The various branches of the subject are discussed in chapters on Experimental, Abnormal, Animal Psychology, &c., very clearly, and with a minimum of technical terminology. The non-specialist reader who wishes to know a little of the methods and results attained in each of these directions will find the book very useful. If his appetite is whetted, he will find a commendably short bibliography at the end of the volume. Perhaps the least satisfactory chapter is that which deals with abnormal psychology. It is largely given over to what is sometimes called the occult side of the subject—hypnotism, telepathy, &c. It would surely have been more useful to have given a simple account of work done by alienists and criminologists. J.A.G.

"**Outline of a Course in the Philosophy of Education,**" By J. A. MacVannel, Ph.D. (ix + 207 pp.) The Macmillan Co. 4/- net.

Dr. MacVannel is Professor of the Philosophy of Education in Teachers' College, Columbia. His book is rather an expanded syllabus than a complete treatise. Its arrangement is clear, and, although its range is wide, the choice and treatment of topics are all determined by the actual problem of the schoolmaster. There is an almost superabundance of references. These are very useful, though we cannot help thinking that they would be still more so if they were a little more specific. Thus, at the end of the section entitled "Institutional Factors in the Educational Process," there are references to some thirty volumes, ranging from Caird's *Philosophy of Religion* to Ritchie's *Natural Rights*. In each case, it is the book which is mentioned without any further guidance. The books have, of course, indexes in most cases, but even then it is possible to miss just the section which is relevant to the points under discussion. In the case of Ritchie, for example, the index is of very little use to this particular end. If references are to be really helpful they should be more precise. J.A.G.

"**Gardens and their Meaning.**" By Dora Williams. (ix + 235 pp.) Ginn & Co. 4/6

To deal first with the faults of Miss Williams' book—as they present themselves to us. One is bound first of all to say that the book is padded—there are "pictures" that are in no sense "illustrations," and the contents of a sixpenny gardening book have been quite unnecessarily incorporated; secondly, the book is too expensive—true it is well produced as to binding and paper, but as a book for teachers both the number of pages and the price of them might have been reduced; lastly, the author was, we think, unwise to sneer at the less clever "spectacled teachers," as she dubs them.

We are, however, very glad indeed to see this book and to recommend teachers to buy it, for it shows that on the other side of the water, as on this, the proper place of the Garden in school-life and school-work is coming to be recognized.

Too many of the school-gardens now provided in this country are being used simply for the purpose of teaching horticulture, instead of entering as they should and could into every part of the work of the school. "Gardening" should mean, for schools, the out-door study of Nature, and the garden should be the scene of personal study of living, growing things, and of investigation into the phenomena of plant-life. The æsthetic and moral value of the part it may be made to play is hardly to be exaggerated; of the hygienic value of the practice of taking instruction in the garden nothing need be said. What a priceless boon it would be if Garden-Schools, or Nature-Study Gardens, were provided around our cities, and scholars from congested areas taken out to them, say, half a day a week. All these matters this volume deals with; the last suggestion is put thus: "Every section of a city should have within access a demonstration garden with a consulting gardener at the head"; we would add that this consulting gardener should himself be, or have been, a teacher.

People who work in Open-Air Schools, or who have school-gardens, would certainly do well to see this very suggestive, if slightly provocative, book.

J. Eaton Feasey.

"An Introduction to Experimental Psychology." By C. S. Myers, M.D., Sc.D. (Cambridge Manuals of Science and Literature). Cambridge, 1911, 8vo., pp. vi + 156. Price 1/-.

This is neither an introduction of the formal type to the subject of Experimental Psychology, nor is it a general survey of the subject in brief. Instead of attempting either of these things, Dr. Myers has, to use his own words, "selected various topics which may fairly be considered typical themes of research," and "endeavoured to present them in such a form as will give the educated reader a general notion" of the scope and methods of the science. I am not sure that a more systematic treatment might not have been of wider utility; but, however that may be, these brief chapters in which Dr. Myers discusses colour vision and other sensory experiences, the Müller-Lyer illusion, experimental æsthetics, and mental tests and their uses are most lucidly and charmingly written, and are likely to attract many to a future study of the subject—which is, after all, their main purpose. T.L.

"Outlines of the History of German Literature." By J. S. Robertson, Professor of German in The University of London. William Blackwood & Sons, Edinburgh and London, 1911.

This is a brief introduction to a subject which has been treated with more detail and with illustrative passages and bibliographical footnotes in the same author's "A History of German Literature," published in 1902. The proportion of the space allotted to mediæval and modern literature respectively has remained the same in the "Outlines" as in the "History." The principle on which both books are founded is—in the author's own words—"to keep as far as possible to accepted judgments, rather than to obtrude divergent personal views." The smaller book professes to lay down general lines of development rather than to heap up biographical or critical detail. Yet the list of writers and works treated is very complete for a book of this size, and Pass Students especially will greet the "Outlines" as a welcome text book. A new and very useful feature of the "Outlines" consists in the extensive chronological tables at the end of the volume, where the events of German literature are paralleled with those of English and other literatures. Synchronistic reference to English literature is also made in various parts of the book itself. J.F.

"The Pronunciation of English: (i) Phonetics, (ii) Phonetic Transcriptions." By Daniel Jones, Lecturer on Phonetics at University College, London. Cambridge University Press, 1911.

We must be thankful when so excellent a phonetician as Mr. Daniel Jones puts his knowledge at our service. His book is one which will be full of instruction, even to those who know something of the subject. It is doubtful, however, if it is not somewhat too subtle in its discrimination of sounds for the students and teachers in Training Colleges for whom it is chiefly intended. Dr. Jones employs 39 different symbols to represent the ordinary sounds of standard Southern English (not including diphthongs), and 49 more for exceptional variations from the ordinary sounds. A teacher must be a specialist if he is to keep the values of so many symbols in his head. The book has, however, many interesting features: one need only mention the use of curves to represent the rise and fall of intonation—the most difficult part of speech to represent to the eye—and the specimens of English as normally produced under different conditions, as well as in the pronunciation of certain individual speakers. The book will have a special value for London teachers, from the directions it gives for correcting Cockneyisms. There is little fault to find with the pronunciation he lays down as normal, though one may not be quite satisfied with his representation of "retired" ("ritaiəd"), "quivered" ("kwivəd"), "extremities" ("*i*kstremitiz"), "expectant" ("*i*kspektənt")—all on p. 73—nor "the horizon" with the open sound in the article (p. 74). Nor do we think the final syllable of "disasters" (p. 74) is the same as that of "generous" (p. 75). Each is represented by Mr. Jones as "əz." G.C.M.S.

"The Beginners' English Grammar." By F. W. Harrison and E. Harrison. xii + 143 pp. Longmans, Green & Co. 1/6.

This little book is written with the specific object of introducing the new Terminology of the Joint Committee organized by the Classical Association. Its procedure is otherwise not different in principle from that of many other School Grammars. The old definition of Verb, of Subject, &c., are adopted.

When Browning wrote

> " You should have heard the Hamelin people
> Ringing the bells till they rocked the steeple,"

was he really talking about " you " ?

Apart from these fundamentals, the book is well done, and is provided with a rich supply of exercises which teachers will find useful whether or not they adopt the particular methods suggested. J.A.G.

" Educational Needlecraft." By Margaret Swanson and Ann Macbeth. (xiv + 136 pp.). Longmans, Green & Co. 4/6.

THIS book, with its beautiful coloured plates, true designs, lucid reading, and fine preface by Miss Margaret McMillan, will prove an increasing joy to those who possess it, and work along its lines. The two authors are indeed the fairy godmothers of the " Cinderella of Manual Arts—Needlecraft," and the magic touch which beautifies the commonplace is seen throughout the treatment of such homely fabrics as linen towellings, simple woollen and cotton materials, unbleached calico, and mending yarn. An ideal blending of helpful direction to purposeful work, and freedom in modifying and planning a fresh adventure is the result of the "Type" method of teaching ; the girl "who has been taught to make the simple Type with knowledge of proportion . . . is able not only to imitate and emulate the type, but dreams and devises with interesting expansions." Of course there are no " specimens," though the heading of some of the chapters suggest them, but the various stitches are introduced in simple things that children love to make. These are arranged in no haphazard fashion ; indeed, one of the outstanding values of the book lies in the careful way in which the craft keeps pace with the growing child. The book is divided into three sections, each prefaced by a short sketch of the normal child at certain periods, from six to twenty years.

The little child rejoiced in the splendid gay colour she used in her bold stitching to fix the wide hem of her bag. She has never given it up, and in early and late adolescence she still makes beautiful decorative work on her pinafores and frocks ; we see the hand inspired by feeling, and beauty shining from the work as it continues to be a faithful expression of the worker's joy in creating.

" Once the true relations between the power to do and the power of the mind to be led forth to desire further doing by the things done is realized, one can see no end to the increase of life's energy," as Dr. Greville Macdonald puts it, and this is just what the authors of Needlecraft have so fruitfully realized.

W. A. BONE.

" Zoology." By J. Graham Kerr, F.R.S. (vii + 99 pp.) J. M. Dent & Sons. 1/- net.

IT is far more difficult to write a good Primer than a Text-book, and Messrs. Dent have been wise to entrust the work to experts in their subjects. Professor Graham Kerr, in his Primer of Zoology, has ventured to employ the current terminology of the science without in any way discouraging or bewildering the ordinary reader. Indeed, the only doubtful passages in the book occur when the author uses everyday terms. For example, the statement that the protoplasm of the worm's skin hardens into the cuticle that covers it is unfortunate, and the hydra surely does not turn somersaults, but loops like a geometer caterpillar. With such an interesting story to write, it is a pity that the author was confined to so small a space. Condensation is overdone when the main groups of animals have to be reviewed in 25 small pages, and it is obvious that the agricultural work of the earthworm would not have escaped mention but for lack of space. T.J.E.

" The Story of the People's College, Sheffield " (1842 - 1878.) G. C. Moore Smith. (vi + 73 pp.) J. W. Northend, Sheffield. 2/6 net.

The People's College, Sheffield, deserved a chronicler, and it was a happy inspiration which led Professor Moore Smith to gather together the scattered materials from which its story could be told. As all the world knows, it was the People's College which inspired Frederic Denison Maurice and the founders of the Working Men's College in London. It was a precursor of such modern movements as are represented by University Extension and the Working Men's Education Association. The little book should, we think, find a corner in all Education Libraries as dealing with an episode in the great social movement which led ultimately to the nation's shouldering nine-tenths of the whole burden of the education of her citizens.

BOOKS RECEIVED.

(Notice in this column does not preclude more detailed review in a later issue).

"Longman's English Course for Indian Schools," J. C. Allen.

An interesting series, exemplifying the use of the *Direct Method* of teaching our language to the children of India. The prices vary from 2d. to 8d.

"Rural Handicrafts," G. F. Johnson. (viii + 135 pp.) Pitman. 2/6 net.

A thoroughly practical book by an expert craftsman and teacher.

"The Sexual Life of the Child," Dr. Albert Moll. Translated from the German by Dr. Eden Paul. (ix + 339 pp.) G. Allen & Co. 15/- net. (Demy 8vo.).

Dr. Moll's book is the most authoritative treatise upon this difficult subject. It is not written for the general public, but for doctors, lawyers and schoolmasters. We commend it warmly to our readers, both on account of the clearness with which the subject matter is set forth and the importance of the topics which it treats.

"Syllabuses in Use in the College Demonstration Schools." (London Day Training College).

"Character Training." E. L. Cabot and E. Lyles. 384 pp. (G. Harrap & Son.) 3/6 net.

"The Evolution of Educational Theory." Professor J. Adams. (ix+410 pp.) Macmillan & Co. 10/- net.

"Experimental Domestic Science." R. H. Jones, M.Sc. (ix+235 pp.) Heinemann.

"La Pédologie" (Synthèse) par M. C. Schuyter. (Maison d'Edition Vanderpoorten, Gand.) 229 pp.

"La Revue Psychologique." "The School Review." "The Woman Teacher."

"Boas' New Theory of the Form of the Head." By P. R. Radosavljevich, Ph.D. (Reprint from American Anthropologist.)

"Mental Measurement." By W. Brown, D.Sc.; (vii + 154 pp); Cambridge University Press.

"The Gateway of Knowledge." An Introduction to the study of the Senses; By J. A. Dell, M.Sc.; (xii + 171 pp.); Cambridge University Press; 2/6.

"A Treasury of Prose and Poetry for Learning by Heart." Selected by Amy Baxter; (six parts, 4d. to 6d. each, paper covers); G. G. Harrap & Co.

"The Nervous System." An Elementary Handbook of its Anatomy and Physiology. J. D. Lickley, M.D. (xii + 130 pp.).

Specially written for students of psychology and neurology. Admirably illustrated.

"Psychology," The study of Behaviour. W. Macdougall; **"Modern Geography,"** Dr. M. Newbiggin; **"Introduction to Mathematics,"** A. W. Whitehead, F.R.S.; **"Peoples and Problems of India,"** Sir T. W. Holderness. (Home University Library), Williams & Norgate, 1/- each volume.

CORRESPONDENCE.

"A SKETCH OF A GIRL'S EDUCATION."

To the Editor,

SIR,—Abler persons than myself have undertaken a more complete reply to the article which appeared in your last issue entitled "A Sketch of a Girl's Education," but I am venturing to incorporate into the more ready framework of a letter some of the many difficulties which even "the pure and exquisite literary style" of the author cannot mask.

"Humility, the fairest jewel of girlhood, is the crown of womanhood," . . . "We claim as the elements of a girl's education . . . a spirit whose root is deep in the soil of mystery and whose bloom is humility." Thus writes our author at the end of his essay, and surely the position is well chosen, for, perchance, the charm of style of the intervening paragraphs may have dimmed the picture so vividly conjured up in the opening paragraphs, of the contrast between Man and Woman—Woman the Hunter, Man the Hunted. Now, we must deck the brows of the Hunter with the crown not of laurels but of humility. Perhaps we should interpret our author aright if, beneath this picture of the Hunter holding aloft the trophy Man, we wrote the legend: "A poor thing, Sir, but mine own."

But for graver reasons our author fails to satisfy. This humility is a virtue, and an essentially Christian virtue. The other virtues had been displayed before, but in no one of the most perfect characters portrayed by the best of heathen writers do we find humility. Even amongst the Old Testament Saints it is not humility we find; we only find meekness, i.e., submission to rebuke, with no undue resentment of it. It has been said "At the Fall man's eyes were opened, and the feeling of shame was born; at the Incarnation man's eyes were opened, and the feeling of humility was born." Only through Christianity, then, would it seem that the woman can learn this grace, yet the author who deems it her most precious jewel does not even pause to make this clear.

Again, Humility, like all other virtues, needs cultivation. Let us, then, consider how it is to be obtained. Surely by the steadfast fighting against the contrary vice of Pride. But Pride is like Proteus, no sooner conquered in one form than it springs up in another. Its manifestations are (i) Self-complacency: (ii) Self-advertisement, the hunger for praise and admiration, the gathering up of every crumb of flattery; (iii) Vanity, perpetually thinking of what other people are thinking of us. But surely the Hunter in the moment of triumph is rather decked with self-complacency than humility, and who, trained only to please Man and with the possession of a man as the sole object of her existence, could cultivate humility in lieu of self-advertisement and vanity?

Never once in the whole essay do we find the word "motherhood." True, the mystery is hinted at—"the fruits of triumph are for the race," . . . "she represents and keeps in custody, the hard, enduring powers of nature, birth, growth, decay, and birth once more"; but the girl is not prepared for it. Since books of "information" are denied her, and all that she learns of such "details of fact" is acquired as she sits in a room or walks in a street, her physical structure and all the wondrous processes of life in which she is so intimately concerned are either unknown to her or learned under distressing circumstances. Surely it is far better that, as well as fairy legend and chivalrous stories, she should learn from good women these elemental facts of life, should realize the capacity of her own nature, her responsibilities and the qualities to be looked for in the father of her children, and that tragedies such as that depicted in "The Fruitful Vine" should lie outside the realm of possibility.

Another man—for Professor Campagnac must realize that the cloak of anonymity does not mask the sex of the writer—has attempted the impossible: "A Sketch of a Girl's Education." His predestination to failure is indeed foreshadowed in his own words: "His (Man's) attitude to her (Woman) is that of a devotee, and a devotee *who had surprised the mystery* would be a devotee no more."

Yours faithfully,
C.S.

GENERAL NOTICES.

The Presidential Address of the Education Section of the British Association will be given on Thursday, Sept. 5th. Professor Adams will deal with the Methods and Results so far achieved by exact Methods of Research in Education.

Amongst other subjects to be discussed, perhaps first place should be given to that which will arise out of the Report of the Committee on Mental and Physical Factors involved in Education. It will be concerned with the physical processes involved in reading, writing and spelling, and the practical corollaries. There is so much bad practice current in the schools that anything which the British Association can do to spread a knowledge of *ascertained fact* will be very welcome. This subject is provisionally arranged for Monday, Sept. 9th.

The Section is also to discuss the pressing problem of *Vocational Training*. Miss Faithfull, Miss Burstall, Mr. J. W. Peck, Mr. J. L. Holland, and Dr. Morgan have already promised to take part. "The present position of Mathematical Teaching" will occupy another session. Professor Perry's paper at Glasgow may be said to have started the "reform" movement, on the results of which such varying views are current. The discussion is therefore peculiarly opportune. Sir Oliver Lodge, Professor Perry, Dr. T. P. Nunn, Dr. Pinkerton, Mr. W. P. Milne and others are expected to take part.

A paper on the Scotch Education Department by Principal Donaldson is sure to lead to a lively discussion. There are also to be papers on *Examinations* and *Leaving Certificates*, as well as an extremely important report on *School-books and Eyesight*. The programme is so full and interesting that we hope it will attract a large number of readers of this *Journal*.

"MIND." For sale, complete set (Old and New Series), from beginning to January, 1911—140 numbers in original wrappers—clean copy. Price £15.
Address: X., care of Editor. (Advt.)

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THE MENTAL DIFFERENCES BETWEEN THE SEXES.—*Continued.*

By CYRIL BURT, M.A., and ROBERT C. MOORE, M.Sc.[1]

IV.—Theories.

THEORIES propounded to explain sex-differences have commonly been in character biological. The whole world of higher animals is divided into two halves, male and female. Primarily, the distinction has reference to the mode of reproduction. The biological value of the division is in this respect comparatively clear. It appears upon experiment that even the lower and asexual organisms cannot continue reproducing their kind indefinitely without conjugation. Unless individuals representing two different families or stocks from time to time unite, the succeeding generations degenerate and eventually die out. Among the higher animals bisexual fertilization effects a similar rejuvenescence of the species. Further, the mingling of the germplasms from two different stocks forms, according to a well-accredited view, the essential condition for the congenital variations of peculiarities by which the new individual deviates from the hereditary qualities of his parents. If characters acquired by a parent during that parent's lifetime cannot be inherited by his offspring, these congenital variations form the sole material from which nature can 'select' the fitter types. Sexual differentiation is thus essential to the preservation of the species and to the progress of the race.

Associated with the 'primary' differences between the sexes are others whose function is more obscure. In man, the sexes are distinguished by peculiarities in height and strength, in voice, in growth of hair,and, it is commonly believed, in mind. These have no direct reference to the processes of reproduction. They are classed as 'secondary' sex-differences. For their immediate cause they seem dependent upon the development of the primary characters. They appear with the appearance of these at puberty; and with the disappearance of these after surgical operation or at the climacteric they disappear. Their ultimate origin has given rise to much controversy. The chief explanations we may group under five main heads.

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[1] Mr. Moore is responsible for the experiments upon the main group (Wallasey School Children); for the earlier experiments upon the smaller groups, and for the theoretical portions of the paper, Mr. Burt is responsible. To Mr. Corkhill we are indebted for assistance in re-working and checking many of the statistical calculations. For their courtesy in permitting the experiments referred to in the following pages to be carried out upon their pupils and students, we are indebted to the Head Masters and Head Mistresses of the following schools: the Preparatory School for Boys, and the Central (Higher Elementary) School,(Oxford), the Aigburth Vale Secondary School for Girls, the Holt Secondary School for Boys and Girls, the Harrington Council School, Granby Street Council School, and the Hebrew Institute (Liverpool), the Rawson Road Council School (Waterloo), the Higher Elementary School (Wallasey), and the Dinnington Council School (Yorkshire); and also to the Principals of the University Training College for Men and Women, and the Edge Hill Training College for Women (Liverpool). To many of the masters and mistresses of the schools in question we are further indebted for assistance in supervising or in repeating some of the tests. To Mr. A. Davies and to Miss M. C. Moore we are indebted for some results of their experiments upon imagery and emotions in children. Full accounts of the various experiments we hope shortly to publish in detail elsewhere.

1.—Selection Theories. The most comprehensive and the best-known attempt to account for secondary sex-differences is the theory of *sexual selection* advanced by Darwin.[1] This theory assumes a competition among males for the female, or, perhaps more rarely, among females for the male. In this struggle—a struggle not for existence but for reproduction—some of the rivals fail, others succeed. Those who succeed are those congenitally endowed with some advantageous characteristic, such as superior physical strength or superior mental cunning, superior pugnacity or superior courage, or, among the lower animals, with peculiar weapons, such as the antlers of the stag or the spurs of the game cock, or with peculiar allurements, such as the tail-feathers of the peacock or the call of the solitary song-bird. The candidate who by these means succeeds in ousting all other rivals and in winning his mate, hands on by reproduction the characteristics which brought him success, to his offspring.

Natural selection also has doubtless played a part—according to some, the predominant part.[2] Each sex has its own environment, and its own mode of life. The characteristics, therefore, which enable each to escape elimination and achieve survival differ in either case. Exposed as she is while laying eggs, a female butterfly or bird would attract the notice of her enemies, were she as conspicuous in colour as the male butterfly or as loud in song as the male bird. Unencumbered by an elaborate reproductive system which, in the female, particularly in the viviparous female, is necessarily complex and exhausting, the male becomes more restless, more rapid, and more alert; it thus can risk the dangers of detection with impunity. The nature of the secondary characters of either sex is thus explained in accordance with established evolutionary principles.

One point, however, is not explained. It is not clear why these secondary characters remain confined to a single sex; why the conspicuous strength or beauty which enables the male parent to vanquish his rivals and to win his bride, is transmitted only to his sons; and why the coyness and aloofness which enable the female parent to escape her enemies, and avoid all males but the fittest mate, are transmitted only to her daughters. How is it that the qualities of both parents do not blend in equal proportions in all the offspring? To this question the selectionists had no satisfactory answer.[3] It is this difficulty that subsequent theories endeavoured more adequately to meet.

2.—Developmental Theories. A second group of theories traces the existence of secondary sex characters to the inequality of individual development produced by the primary sex characters. A girl becomes a woman sooner than a boy becomes a man. This indicates, it has been said, not that a girl grows up more quickly, but rather that she stops growing first; to become precocious is to remain immature. The special activity of her reproductive system, says Herbert Spencer, arrests her general development earlier, and, in consequence, she resembles a man whose individual evolution has been incomplete. Darwin himself had pointed out that, in most of the higher animals, the adult female is more like the young of either sex than is the adult male. A similar generalization appears to hold good of man. At first the development of boy and girl runs parallel; at puberty the two sexes begin to develop in opposite directions; eventually the male diverges from the type characteristic of the whole species far more than the female. Woman thus remains more of a child and something of a savage. She is, in mind and body, "undeveloped man." [1]

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[1] Darwin, *The Descent of Man, and Selection in relation to Sex* (1883); cf. esp. Chap. xix, p. 563 (2nd ed.) for the "Difference in the mental powers of the two sexes" in man.

[2] Darwin, *loc. cit.*, p. 565, &c. A. R. Wallace, cf. also Chap. xv. *Darwinism* (1889), p. 283.

[3] Darwin suggested that characters transmitted to one sex only are characters acquired by the parent of the corresponding sex during the procreative period. This, however, does not explain sex-limited inheritance; it merely re-formulates the fact to be explained (cf. p. 362).

The foregoing theories have much in common. As has been neatly said, "Darwin's man is an evolved woman; Spencer's woman is an arrested man." There may still be found psychologists who maintain the mental superiority of the male, and base their theories upon the principles laid down by Darwin and Spencer. According to them, the mental differences between the sexes are due to the male's further advance along the highest levels of mental life, namely, the intellectual; "L'intellectualité supérieure est un proprieté spécifique mâle," writes one eminent continental psychologist.[2] In consequence, they demand that the training of the mind given to the male shall differ from that given to the female. "Scientific pedagogy indicates that we must advance towards the education of individuals as individuals, and that we should classify them according to their individuality into groups. It follows that the first classification, which will always operate with certitude, is that based upon sex."[3] Schemes of feminine education are accordingly drawn up which shall at once avoid overwhelming and overworking the mind of the girl with intellectual studies, and at the same time fit her for the more lowly part which she must naturally and inevitably play in domestic and social life.

3.—Constitutional Theories. A yet more recent theory maintains that woman is "not undeveloped man but diverse." Each sex is the necessary correlative and natural antithesis of the other. This diversity is regarded as the inevitable outcome of a fundamental difference in physiological constitution.

This diversity is not due to a mere difference in certain organs or in certain functions; it is the expression of an all-pervading antagonism in the chemical processes or "metabolism" of the component cells throughout the body and brain. The contrast is traced back to the male and female germ-cells. The spermatozoon, or male germ-cell, is small and active; the ovum, or female germ-cell, is large and inert. The former is katabolic—expending energy; the latter, anabolic—storing it up. This analogy is extended to the entire organism, male or female, according as it produces either kind of cells. In size, it is alleged, the female is commonly the larger; the male, smaller. In habit, the female is passive and submissive; the male, active and enterprising. In structure, the female is economical; the male, prodigal in excrescences of hair, of bone and of feather, in odourous secretions, and in brilliant pigments.

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[1] Spencer, *The Study of Sociology*, (9th ed.), p. 368 seq. The theory is accepted and further elaborated by H. Campbell, *Differences in the Nervous Organism of Man and Woman*, esp. Pt. II, Chaps. vi-ix, "Woman as Undeveloped Man." An allied position is adopted by Havelock Ellis, *Man and Woman*, who, while regarding women as being nearer to children than are men, considers that "woman is not undeveloped man," because "the child represents a higher degree of evolution than the adult." The most notorious advocates of the mental inferiority of women are P. J. Möbius (*Ueber den Physiologischen Schwachsinn des Weibes*), and Otto Weininger (*Geschlecht und Charakter*), whose books have run to six or ten editions, and have both been translated into English.

[2] M. C. Schuyten (Professor of Psychology in the University of Brussels, Director of the Pedological Laboratory at Antwerp), *L'Education de la Femme*, p. 134.

[3] Id., Ibid., p. 175.

Consequent upon the fundamental differences in physiological constitution are peculiarities in intellect and temperament exhibiting an analogous contrast. Man is progressive; woman conservative. Man is egotistic; woman altruistic. Man is self-regarding; woman regards the species. Man is rational; woman emotional. Man is inventive; woman receptive. Thus, as in body, so in mind, neither sex is inferior, each is the equal and each the opposite of the other.[1]

The existence of a fundamental contrast in constitution between the sexes would necessitate fundamental differences in their education. The advocates of the theory themselves point to this corollary: "Not until woman, as woman, has found her own most fitting mode of self-expression, and the training that fits her for this, will society derive the full benefit from her labours."[2]

A similar view is favoured by Professor Welton in his book on the Psychology of Education. In discussing the educational implications of sex-differences in mental endowment, he maintains that "evolution points the way to . . . equality in value of complementary functions, not the obscuring of differences already established." "The higher the level reached, whether by individuals or societies, the more strongly marked become essential differences. Neither the obscuring nor the attrition of differences due to sex can, then, be expected, unless the future retrograde from civilization towards savagery. Among savages the distinctions are less marked than among peoples which have advanced far on the road of civilization, and among the lower animals they are still emphatic." These considerations, he urges, have been neglected more particularly by promoters of mixed schools. "At the bottom of the advocacy of mixed schools lies the idea, which for the reason given I believe to be profoundly mistaken, that true evolution means the gradual elimination of the differences of sex. When we consider what those differences are, and rid ourselves of the suspicion that, intellectually, woman is an imperfectly-developed man, . . . it becomes clear that if mixed schools are to be justified . . . the grounds must be overwhelmingly strong to justify the ignoring of the psychological objections." [3]

4.—Environmental theories. A fourth group of theories regards secondary characters as due, solely or mainly, to environment. Environment is by them conceived as acting, not upon the species by elimination of the unfit, but only upon the individual, moulding, and re-moulding afresh, each successive generation. In mental characteristics, men and women are born approximately equal, and become different only in virtue of subsequent external influences.

This was the belief of John Stuart Mill.

"If women's nature were left to choose its own direction as freely as men's, and if no artificial bent were given to it except that required by the conditions of human society, and given to both sexes alike, no one can safely pronounce that there would be any material difference, or perhaps any difference at all, in the character and capacities which would then unfold themselves . . . Even the least contestable of the differences which now exist are such as may very well have been produced merely by circumstances, without any difference of natural capacity." Hence, he argues, the assumption of innate differences is an unnecessary and unwarrantable hypothesis.[4]

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[1] Geddes and Thomson, *The Evolution of Sex*; cf. esp. Chap. xix, "Psychological and Ethical Aspects." The mental implications of the theory have been accepted and further elaborated by Fouillée, *Temperament et Caractère*, cf. esp. Livri III, c. i-vi. "Tempérament et caractère selon les sexes."

[2] Prof. J. A. and Mrs. Thomson. "Women and Eugenics," *Eugenics Review*, Vol. IV, No. 3, (October, 1912.)

[3] J. Welton, *The Psychology of Education*, pp. 128, 137.

[4] J. S. Mill, *The Subjection of Women* (1869), chap. iii; cf. also, id. *A System of Logic*, II, p. 456.

At the present moment this seems to be the prevailing view. "One might characterize the drift of recent discussion (writes one psychologist) as a shift of emphasis from a biological to a sociological interpretation of the mental characteristics of sex."[1]

Of recent formulations of this position perhaps the clearest and most uncompromising is the following: "The intelligence, emotions, and desires of the human infant at birth differ not at all perceptibly, as its sex may be male or female. Such psychic differences as appear to exist in later childhood are undoubtedly very largely the result of artificial training. Even in the fully adult human, in spite of differences of training, the psychic activities over a large extent of life appear absolutely identical. Where psychic sex-differences appear to exist, subject to a rigid analysis they are found, in an immense majority of cases, to be purely artificial creations." This position the writer supports by detailed biological arguments. "In the animal world, all forms of psychic variations are found allying themselves now with the male form and now with the female." These arguments are further corroborated by observations drawn from the study of various human societies and various human races. "When other races or classes are studied . . . psychic sex-differences characteristic of our own . . . are found non-existent."

In physical structure and in bodily strength, in mental life so far as it related directly to reproductive functions, in these spheres alone are differences apparent. Elsewhere they vanish. The male and female brains acquire languages, solve mathematical problems, master scientific details in a manner wholly indistinguishable. "In the factory, in the mart, in the designing room, in the laboratory, in the study, in all fields of abstract and impersonal labour . . . woman as woman has little or nothing to contribute that is radically distinct from that which man might supply." Nor has man anything to contribute radically distinct from woman. In the present stage of civilization these are the fields that matter. In the past, while the physical work necessary to support human civilization was performed, not by machinery, but by man, men and women necessarily played different parts. Now that human labour has shifted from physical activities to mental, the part that each sex can and must sustain will be in essence similar. Hence, training to fit each sex for the common role must, in all essential characters, be similar too.[2]

The few psychologists who have approached the problem from an experimental standpoint naturally regard all deductions from biological and physiological principles, and all inductions from sociological and historical observations, as precarious. Scattered through a vast literature are experimental measurements of boys and girls, of men and women, obtained incidentally during researches upon other problems. But data sought expressly to decide the present issue—data obtained systematically from comparable groups by comparable methods—these are still lacking. One series of experiments alone is available. At the suggestion and under the guidance of Professor Angell, some twenty-five men and some twenty-five women, students of the University of Chicago, were measured by a number of tests dealing largely with sensations (cf. Table II).[3]

The results are, on the whole, negative; and the methods not beyond criticism. The number chosen to represent each sex is far too small. The age varied from 19 to over 29. The measurements obtained were not verified by repeating the same tests with other groups or (save in few cases) with the same group on different days or with different experiments. We have therefore no measure of the reliability of the tests. In comparing differences the results are not statistically reduced to any one measure; the measurements for the several individuals are plotted in the form of curves, and the degree of difference determined from these by mere inspection. The higher emotional, intellectual, and moral aspects of the personalities compared were estimated by a series of vague questions, such as: "Do you consider yourself very emotional?" "Have you a contented disposition, on the whole?" "What sort of imagery predominates in your thinking?" "Have you decided on your career, if so, is it to be practical, intellectual, or artistic?" "Are the majority of your friends men or women?" "Have you any superstitions?" "Are you frank?"

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[1] Helen Woolley Thompson, "A Review of the Recent Literature on the Psychology of Sex" 1907-1910). *Psychological Bulletin*, Vol. VII, No. 10, p. 342.

[2] Olive Schreiner, *Woman and Labour* (1911), esp. chap. V, "Sex-differences."

[3] Helen B. Thompson, *The Mental Traits of Sex* (Chicago, 1903).

The conclusion drawn is that all the differences are slight. In muscular strength alone is there indication of any considerable sex-difference; and this is largely attributable to training. In the questions on the higher aspects of personality "the most striking thing is the close coincidence in both sexes." Hence "the outcome of this study is that the psychological differences of sex seem to be largely due to differences in the social influences brought to bear on the developing individual from early infancy to adult years." No attempt, however, is made to check this supposition by applying the tests to different stages of this development.

The most serious and the most common criticism of Miss Thompson's work is that her experiments leave untouched the highest and most concrete mental processes of all. "The tests applied (writes Mr. McDougall) are quite inadequate to bring out the innate differences that are socially important."[1] "If the degree of intellectual capacities are to be determined, . . . they will not be measured by means of these laboratory games:" so writes Möbius in the last edition of his notorious polemic against the feminine sex.[2] To deny the existence of large innate sex-differences on the ground of the small sex-differences revealed by experiments upon elementary processes of sensation, movement, or association—this (says Stern) is a "mischievous misconstruction and distortion of the true facts of the case." "The higher, the more complex, the more difficult a function, the clearer are the variations it reveals." And this, he prophecies, future experiments will demonstrate to hold good of variations due to sex.[3]

It is, of course, easy to criticize pioneer work. One fact at any rate these experiments seem clearly to have indicated. Whether significant or insignificant, whether due to training or to inborn constitution, the mental differences between the sexes are much smaller than is commonly believed, and can only be detected and measured by numerous experiments and elaborate statistical methods. Further researches, such as our own, can therefore only be regarded as a contribution towards the compilation of the innumerable measurements which will be necessary before any decisive conclusion can be reached. No one investigator, and no one group can yield results which can solve the entire problem.

As regards the senses, the foregoing experiments comprise the most extensive and most careful data we have for a comparison of the two sexes. The methods are described in full, so that it is possible to repeat the experiments upon different groups of different ages, different nationalities, or different social and cultural status, and to obtain comparable results.

Were the results of these experiments conclusive, were it proven that the sex-differences at every level of mental life were small, and due mainly to environmental influences, the practical implications for the teacher would be obvious. Nor does the investigator hesitate to indicate it. "The question of the future development of the intellectual life of women is one of social necessities and ideals rather than of the inborn psychological characteristics of sex." Indeed, for practical purposes, there would be no inborn psychological characteristics of sex: so completely is the power of environment assumed to overwhelm and modify the influence of heredity.

[1] *Mind*, Vol. XIV (1905), p. 425.

[2] *Ueber den Phsyiologischen Schwachsinn des Weibes* (10th ed., 1912), p. 6-7.

Zeitschrift für Psychologie (1905), p. 400.

5.—Transmission Theories. Many have assumed that the results of environmental influences, acting differentially upon the two sexes generation after generation, must at last have become hereditary.

Darwin himself assumed that the individual might transmit to his offspring modifications acquired during his lifetime, as well as congenital resemblances and variations derived at birth. Upon empirical grounds he laid down two further principles : first, that characters acquired by a parent before the procreative period tend to be transmitted to the offspring irrespective of its sex ; secondly, that characters acquired during the procreative period tend to be transmitted only to offspring of the same sex. Hence, he inferred, "in order that woman should reach the same standard as man, she ought, when nearly adult, to be trained to energy and perseverance, and to have her reason and imagination exercised to the highest point ; she would then probably transmit these qualities chiefly to her adult daughters," who would thus rise to the level already attained by males and not further augmented by inheritance of the results in the sons. In mammals, however, and especially in man, he believed that the second law holds good only to a limited extent. "It is," he says, "indeed fortunate that the law of the equal transmission of characters to both sexes prevails in mammals, otherwise it is probable that man would have become as superior in mental endowment to the woman as the peacock is in ornamental plumage to the peahen."

As an explanation of the mental peculiarities of woman, the inheritance of acquired characteristics has been especially exploited by the Italian investigators. Her sympathy and her tenderness, her timidity and her deceitfulness, these and the other qualites which they discover to be feminine, they assign to the continued operation of the social and economic conditions of former epochs, to centuries of motherhood and of subjection to man.[1]

One recent writer has revived this view of the origin of secondary sexual characters, and endeavoured to support it by a review of the sex-differences of the entire animal kingdom.[2] The weight of biological opinion, however, has during the last few decades turned completely against the possibility of acquired characteristics being transmitted. Hence, theories utilizing this assumption to explain the mental differences between man and woman may here be summarily dismissed.

These, then, are the chief theories which have been advanced to explain the mental differences between the sexes. At the present moment the controversy seems to lie between the third and fourth of the five theories enumerated. The question is refined to a crucial issue by a recent criticism of the environmental theory and a restatement of the constitutional theory by its chief advocate, Professor J. A. Thomson. In a review of the environmentalist position he writes : "The sex-difference is fundamental, and saturates with a differentiating influence every part of the organism. 'A man is a man to his finger tips ; a woman is a woman to her little toes.' To the primary contrast between maleness and femaleness there are added all manner of secondary expressions which may be termed masculine and feminine. The divergence between the two sexes, it appears, is greater in the higher animals than in the lower, greater in man than in the beasts, greater in mind than in body, greater on the higher levels of mental life than on the lower. *The higher we rise in the scale of life the more different do the sexes become.*"[1]

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[1] Lombroso e Ferrero, *La Donne Delinquente e la Donna Normale*, 2nd Ed., (Torino, 1894), pp. 178 seq.

[2] J. T. Cunningham, *Sexual Dimorphism in the Animal Kingdom ; a theory of the evolution of secondary sexual characters*, (1900). cf, pp. 47-54 for secondary sexual characters in man.

This generalization concisely formulates the proposition in dispute. It may be tested by comparing the structure and habits of different species throughout the animal scale, or by comparing different levels of mental and physical activity in the same species.

A comparison of structure and habits of different species is inconclusive.

Against the thoroughgoing biological formulation the following objections may be cited. First, some of the largest differences between the sexes in structure and in habit are found among the lowest creatures. Here, on the ground of morphology alone, male and female forms have often been referred to different species. Thus, among the parasitic crustaceans, the male is often a mere pigmy attached to the female; among the insects, the females of certain flies are blood suckers, that is carnivorous, the males live on flowers and are herbivorous. The sex of higher animals, such as the cat, rabbit, mouse, tiger, bear, often cannot be discovered without examining the creature's reproductive organs or reproductive habits. Secondly, the secondary characteristics assigned to the respective sexes appear occasionally, if not frequently, transposed. Hence the analogy between female and female germ-cell, and between male and male germ-cell appears to rest largely on the selection of favourable instances. It has been well said: "There is truth as well as humour in the suggestion that if the nature of the genital cells were reversed it would perhaps be a little easier for this school of evolutionists to derive the characteristics which the respective sexes eventually develop. Smaller in size, excitable in habit, unstable in thought, woman would correspond to the small and agile 'katabolic' germ-cell; large, strong, calm, deliberate, self-contained man would correspond to the large and slow 'anabolic' germ-cell." To these objections, however, there are obvious if indecisive replies. The first objection, it is said, rests upon the over-emphasis of apparent exceptions, which are but few. The species which are called low with reference to the higher mammals cannot really be directly compared wlth them. They may represent high forms upon a divergent branch, rather than low forms within a single series or scale. The second objection, it is averred, rests upon a misconception of the real nature of the antithesis. But neither retort is final.

The crucial decision, therefore, appears to rest, not upon a comparison of structural differences in different species, but of mental differences with structural and of various mental differences among themselves, within the same species, and preferably within the highest species of all. The decisive battleground is the field of the mind. Are the mental differences between the sexes greater than the physical, or are they not? Are the mental differences greater upon the higher levels of conscious life than upon the lower, or are they not? These, it appears, are the crucial issues for social and educational practice; they certainly are the crucial issues for psychological theory.

V.—Experiments.

A.—Intellectual and Practical Activities.

The only means of adjudicating between these several theories, the only method of assigning to each factor its relative importance as a determinant of sex-differences in mental life, is the method of experiment. Where applied to both sexes under similar conditions, psychological experiments have dealt mainly with simpler intellectual and practical activities, such as sense-perceptions, motor reactions, memory, and attention. These processes have commonly been measured as convenient manifestations of general intelligence. To emotional and moral activities experimental psychology has given less consideration. It is, therefore, the former aspects of mental life, the intellectual and practical—or, in more technical terminology, the cognitive and motor—that we shall discuss first and most fully. As far as possible we shall deal with the several capacities in the order of their development, beginning with processes upon the lower levels of mental life and passing to the higher levels. The criteria by which we may judge whether one process is of a higher or lower order than another are four: First, their supposed order of evolution; secondly, their supposed importance for intellectual and practical life; thirdly, their apparent degree of complexity; fourthly, their apparent correlation with general intelligence. We may roughly arrange the processes in four main classes: Simple perceptual and motor processes, complex perceptual and motor processes, associative processes, and reasoning processes.

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[1] Professor J. A. and Mrs. Thomson. "Women and Eugenics," *The Eugenics Review*, Vol. IV, No. 3 (October, 1912), p. 307. Italics ours.

In comparing the degree of sex-difference in processes of the first three classes, we shall cite chiefly results obtained by one of the writers from forty-three Oxford and thirty Aigburth children[1]; in comparing the degree of sex-difference in processes of the last three classes, we shall cite chiefly results obtained by the other writer from 130 Wallasey children.[2] For adults we shall cite figures obtained by the former writer from about 100 Liverpool University students, mostly members of the University Training College for Men and Women, and the Edge Hill Training College for Women.

We shall seek independent corroboration from the results obtained incidentally by other workers upon other children, and also from the results obtained especially for the study of sex-differences by Miss Thompson from fifty American adults. The data of these investigators we have further elaborated statistically in accordance with the method of calculation already described.[3]

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[1] By the Oxford group we mean the thirty boys of the Oxford Central (Higher Elementary) Preparatory School tested by Mr. Flügel and one of us ("Experimental Tests of General Intelligence," *British Journal of Psychology* (Dec. 1909), Vol. III, Pts. 1 and 2). By the Aigburth group we mean the thirty girls of the Aigburth Secondary School tested for comparison with the thirty Oxford Elementary Boys. The average for the thirty girls and thirty boys has already been given (this *Journal*, Vol. I, No. 2 (Nov. 1911), p. 108, Table IV).

It has been suggested that the Aigburth Secondary girls were taken from a social class slightly superior to that of the Oxford Elementary boys; we have therefore included in the Oxford group the Preparatory as well as the Elementary boys. On the other hand the figures reprinted for the Elementary boys were based in most cases upon three repetitions; the figures for the girls were based upon only one or two. To eliminate the slight advantage caused by slightly greater practice, we have omitted the additional later results obtained from the boys. And the data are now presented in the form of percentage excess instead of averages. The general results of comparing the two groups are virtually as before; hence, it would appear that the differences in social status of the boys and the composite nature of the group do not seriously affect the validity of the comparison.

[2] By the Wallasey group we mean the group described in the earlier portion of this paper (this *Journal*, Vol. I, No. 4 (June, 1912) pp. 283-4). The results are taken from a further and more thorough investigation of the tests originally devised for application to another group of Liverpool children (Holt Secondary School children) and described more fully by one of us in an earlier paper ("Experimental Tests of Higher Mental Processes and their relation to General Intelligence," this *Journal*, Vol. I, No. 2 (Nov. 1911), 96 seq. cf. esp. Table V). On comparing the figures there cited, the reader will find that the results obtained upon the second group by the second investigator closely corroborate the earlier and rougher results.

[3] Many of the figures representing the percentage of men reaching or exceeding the median of the women have already been calculated from Miss Thompson's frequency-curves by Professor Thorndike, and published in his *Educational Psychology* (2nd ed., p. 27). We have re-calculated and altered some of his figures, and completed the list; and have further calculated from them the figures in column three.

TABLE II.—MOTOR, PERCEPTUAL, AND ASSOCIATIVE PROCESSES.

(50 American Students.)

PROCESS TESTED.	of men exceeding median for women.	Excess of percentage over 50%
	per cent.	per cent.
I.—Motor Processes.		
A.—Simple.		
Tapping ...	88	+38
Tapping (fatigue)	89	+39
Reaction-time (visual)	68	+18
Reaction-time (auditory)	70	+21
B.—Complex.		
Card Sorting (speed)	14	−36
Target Test (accuracy)	60	+10
Line Drawing (precision)	72	+22
II.—Perceptual Processes.		
A.—Touch.		
Threshold for Pressure	43	− 7
Discrimination of Pressure	47	− 3
Discrimination of Two Points—		
Lengthwise	18	−32
Crosswise ...	43	− 7
Discrimination of Area	61	+11
Discrimination of Temperatures—		
Cold (5° C.)	36	−14
Indifferent (30° C.)	53	+ 3
Warm (45° C.)	52	+ 2
Threshold for Pain	46	− 4
B.—Muscle Sense.		
Discrimination of Weights	66	+16
C.—Taste.		
Threshold for Presence (bitter)	24	−26
(sour)	32	−18
(salt)	36	−14
(sweet)	40	−10
Threshold for Recognition (bitter)	12	−38
(sour)	25	−25
(salt)	52	+ 2
(sweet)	48	− 2
Discrimination of Intensity (bitter)	65	+15
(sour)	67	+17
(salt)	35	−15
(sweet)	64	+14
D.—Smell.		
Threshold for Presence (violet)	40	−10
(clove)	48	− 2
Threshold for Recognition (violet)	40	−10
(clove)	41	− 9
Discrimination of Intensity (violet)	51	+ 1

PROCESS TESTED.	of men exceeding median for women.	Excess of percentage over 50%
	per cent.	per cent.
II.—Perceptual Processes—*continued.*		
E.—Vision.		
Threshold for Light	62	+12
Threshold for Keenness	54	+ 4
Discrimination of Brightness	78	+28
Discrimination of Colour	24	−26
Discrimination of Area	56	+ 6
F.—Hearing.		
Upper Limit	52	+ 2
Lower Limit	50	0
Discrimination of Pitch	44	− 6
III.—Emotional Processes.		
Physiological Effects (circulation and respiration)	60	+10
General Emotionality (introspection)	50	0
IV.—Associative Processes.		
A.—Memory.		
Speed (words read and heard)	32	−18
Speed (words seen)	46	−42
Retentiveness (words read and heard)	51	+ 1
Retentiveness (words seen)	43	− 7
B.—Continuous Association.		
Number of Associations	42	− 8
Number of Topics	44	− 6
C.—Arithmetical and Mechanical Ingenuity.		
Lock Puzzle	72	+22
Apparatus Puzzle	68	+18
Checkerboard Puzzle	69	+19
Match Puzzle	46	− 4
Arithmetical Puzzle	60	+10
VI.—Acquired Knowledge.		
Physics	76	+26
Mathematics	44	− 6
English Literature	31	−19
History	56	+ 6
Biology	48	− 2
Biography	52	+ 2
Scientific Subjects	60	+10
Literary Subjects	40	−10
Total	52	+ 2

1a.—Simple Perceptual Processes.—Sensation, or more accurately, sense-perception, constitutes the simplest type of conscious process. It forms the department in which experimental psychology has elaborated its technique with the greatest nicety and applied its methods with the greatest frequency. We shall discuss them in the supposed order of evolution and cognitive importance, beginning with the simpler, 'contact' senses, and advancing to the higher, 'distance' senses.[1]

Of our five senses the simplest and lowliest is *Touch*. The commonest and most convenient tactile test is the test of smallest distance at which two points applied to the skin of the front surface of the forearm can be felt as distinctly two. This may be measured by means of a pair of compasses, or (as in our own experiments) by means of a specially-devised instrument known as an æsthesiometer. In the first and most reliable series obtained by one of us with this instrument (Oxford groups) the "spatial thresholds" thus measured show virtually no correlation with intelligence (reliability coefficient for two independent experimenters, ·73; intelligence coefficient, ·13). Subsequent investigations upon boys and girls, and men and women, have confirmed this result. This test shows the largest sex-difference we have yet discovered. Girls are nearly twice as acute as boys; women nearly twice as acute as men. The sexes scarcely overlap at all. In the Oxford and Aigburth groups only 2·3 per cent. of the boys are as acute as the median of the girls; and in the Wallasey group only 12·6 per cent. This gives a sex difference of 47·7 per cent. and 37·4 per cent. in favour of the girls. Among adults the sex difference appears to be about 40 per cent. A similar result was obtained by Miss Thompson. With one doubtful exception (threshold for bitter tastes) this is the largest sex-difference discovered by her (see Table II). Calculating from her data[2] according to the method we have proposed in the first portion of this paper, the sex-difference proves to be 30 per cent.[3] In an earlier paper, attention has already been drawn to this large divergence in discussing sex as a disturbing factor in the use of the æsthesiometer for testing intelligence, and reasons were then given at length for believing it to be due to innate factors.[4]

In an earlier paper, a table drawn up by one of us indicated that not only was the spatial threshold of children acuter than that of adults, as indeed has long been recognized, but also that the spatial thresholds of people of lower cultural status (such as Murray Islanders, Todas, and Dayaks), and persons of lower social status among the same people, such as working men or country children, are acuter than those of persons of high social and cultural status (such as Cambridge graduates and undergraduates).[5] In this respect, therefore, the female sex appears to resemble the savage and the child.

How far does this result hold good of skin sensibility generally? Writers are apt to generalize from differences in one or two instances of perceptual processes to all cases of sense-perception. A reference to Miss Thompson's results will show that this cannot be done even for perceptual processes within a single sensory department, such as Touch. Even the capacity for discriminating two points shows a much smaller sex-difference when tested across the limb instead of lengthwise. In the former case, however, the absolute thresholds are much smaller, the relative error, therefore, very large. Our own experience in varying the mode of application in this test has suggested that a genuine large sex-difference is thus obscured by the coarser and more unreliable method of investigating it. This probably applies to other figures obtained for cutaneous sensibility. Miss Thompson herself admits that the conditions for the æsthesiometric test were far more satisfactory than for the others.

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[1] We make no attempt to discuss in full the data available from other researches. A convenient summary of previous work in this field will be found in Miss Thompson's work.

[2] Helen Thompson, loc. cit., p. 38, fig. 19.

[3] Lombroso is the only writer of importance whose results here contradict our own. (*La Donna Delinquente e la Donna Normale*, p. 50 seq.) But, as usual, his more primitive technique throws doubt upon the validity of his results.

[4] "Experimental Tests of Higher Mental Processes and their Relation to General Intelligence," this *Journal*, loc. cit., pp. 108-9.

[5] *British Journal of Psychology*, loc. cit., p. 119, Table I. The general reader will find the table in Myers' *Introduction to Experimental Psychology*, p. 101.

The relative sensibility of the two sexes to *Pain* has aroused much controversy. Lombroso and other Italian observers have declared that women are less sensitive to pain than men.[1] The meaning of the phrase, pain-sensibility, is ambiguous. Our own rough observations tend rather to support the conclusions of Miss Thompson. Judged by the threshold for pain proper, cutaneous pain caused by pricking, pressing, heat, or electrical stimulation, women appear more sensitive than men. But judged by the more complex capacity to endure with patience deep and diffuse pain-sensation, and indeed painful or unpleasant experiences generally, women appear less sensitive than men. It is possible, however, that the Mediterranean races differ in this regard from the Teutonic.

The consciousness of movement, position, and strain, is not popularly recognized among the five senses. The existence, however, of the sixth, or "*Muscle Sense*," with sense organs of its own deep in the structures of the muscles, tendons, and joints, is now beyond dispute. It forms the chief of the two senses which yield us information as to the welfare and whereabouts of body and its parts, and which are therefore classified as "proprioceptive." It is indeed one of the oldest and most important of all the senses, older, perhaps, even than cutaneous touch. Its acuity may be tested by the power to discriminate lifted weights. The reliability of our results with this test is not high. Boys and men seem decidedly the more acute. The sex-differences in children and adults appear to be about + 40 per cent. Miss Thompson's figures are similarly in favour of the males, yielding a sex-difference of + 16 per cent. This superiority she naturally connects with the superior motor ability of men. It must, however, be remembered that the primary indication of the test is superiority of the male, not in movement, but in at least one department of sense-perception.

For the "chemical senses" of *Taste* and *Smell* we have no figures of our own. Miss Thompson's figures show a somewhat larger sex-difference in the lower, contact sense (Taste) than in the higher, distance sense (Smell). Measured by the recognition of the presence or nature of the taste or odour the women are on an average more acute; measured by the power to discriminate qualities the men are on an average more acute. The results reconcile an apparent contradiction noted by earlier writers,[2] namely, that while the professions involving fine discrimination by smell and taste (tea-tasting, wine-tasting, and so on) are in daily life monopolized by men, women have almost invariably been found to have an acuter power of recognizing tastes and smells. The former depends largely upon a low relative threshold; the latter upon a low absolute threshold. The distinction again reminds us how precarious it is to argue from superiority in one form of exercising a given sense to superiority in another.

The highest of the forms of sense-perception are undoubtedly those furnished by the long range senses, *Hearing* and *Vision*. They appear comparatively late in the evolutionary series. They form the primary basis of the intellectual life of man. These furnish far more numerous sensory qualities for cognition than any other sense. They mediate perceptual processes of considerable complexity. And, of all the senses investigated, they furnish the only appreciable correlations with intelligence (·38 and ·23 respectively, cf. Table III). Of the two, hearing may for our present purposes be regarded as the higher. It yields the larger correlation with intelligence[1]; and is the sense whose development has mediated the development of language, and therefore, indirectly, of the rational processes of conception, judgment, and inference.[2]

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[1] *La Donna Delinquente e la Donna Normale*, p. 58 seq.

[2] F. Galton, *Enquiries into Human Faculty* (1883), p. 29.

Tested by the power to discriminate by ear small differences in the pitch of tones emitted by tuning-forks, girls and women alike appear to be somewhat superior. The sex-difference is, in children, −29 per cent.; in adults much smaller, about −10 per cent.[3] Miss Thompson finds an equally small difference in the same direction. Tested by the power to discriminate by eye small differences in the length of lines (Rivers' line board) boys and men appear to be superior. The sex-differences are larger, +31 per cent. in children and +25 per cent. in adults. Tested, however, by the power to discriminate differences in colour, women appear to be superior and the sex-difference is larger still (about −35 per cent.). Miss Thompson's results harmonize with our own. In discrimination of colour her figures yield a sex-difference of −26 per cent. in favour of the women (five out of twenty-five of the men, however, i.e., 20 per cent., she grades as colour-blind). If such cases be regarded as pathological and anomalous, and excluded in consequence, the sex-difference sinks to a much lower figure. In discrimination of size (tested, however, with areas not lengths) her figures yield a sex-difference of +6 per cent. in favour of the men. In discrimination of degree of brightness she finds a great superiority on the part of the men (+28 per cent.); and in recognition of the presence of dim light a small superiority on the part of the men (+12 per cent.); and in keenness, recognition of spots according to size or distance, a doubtful superiority on the part of the men (+4 per cent.).

In view of the theory of the arrested development of women, it is of importance to compare differences due to sex with differences due to race and age. We have seen that in one of the lowest senses, namely touch, woman resembles both child and savage in being more acute. When, however, we come to the higher senses, for instance, hearing, we find that it is men who resemble children and savages in being somewhat less acute.[4] In vision, savages and children appear to correspond with men in being slightly keener in form-vision, and usually less keen in colour-vision. Men from the Murray Islands seem as free from colour-blindness as European women. Toda men, on the other hand, are even more liable to it than European men. The parallel, therefore, so often drawn between the supposed superiority in sensory acuity in women and the supposed superiority in sensory acuity among children and savages, finds no support from experimental investigations.

From the foregoing summary of the difference between the sexes in regard to sense-perception, the following inferences may be drawn. In the first place, the differences established are of such a nature and of such a size, so similar at different ages and in different groups, that it appears impossible to explain them away as due merely to differences in education or experience. They must, it would seem, be due to innate differences either in the sense organs and associated peripheral structures, or in the sensory areas of the brain and associated nerve structures. Secondly, these differences cannot be summarized by saying that women are throughout more delicate in sense-perception than men, or that the superior development of women on the receptive or sensory side is correlative to the superior development of men on the active or motor side. Thirdly, these differences cannot be summarized by saying that women are superior in the lower levels of mental life though

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[1] For the close correlation between hearing and intelligence, cf. also Spearman, "General Intelligence objectively measured and defined," *American Journal of Psychology*, Vol. XV, pp. 286 290.

[2] For the intimate connection between hearing and the higher functions of the human brain, cf. also Bolton, *Further Advances in Physiology*, pp. 328, 330.

[3] Our figures for adults are throughout less reliable.

[4] cf. Table given by Myers, *Introduction to Experimental Psychology*, p. 98.

men may be superior in the higher levels of mental life, or that men are further removed from the child and savage than women. Fourthly, as has been noted by others,[1] there is some evidence to show that "the thresholds (i.e., absolute sensibility) are on the whole lower in women; discriminative sensibility, on the whole, better in men." Again, the generalization is not without notable exceptions. Finally, to explain these differences in terms of sexual selection is possible, but inconclusive. We might suppose that the muscular sensitivity in the primitive male was developed by the "selection" incidental to his mode of life as a hunter or a fighter; and that the sensitivity of the female in recognizing colour, notes, odours, and contacts was developed by the selection incidental to her choice of the more vigorous and the more stimulating male, of the male who is more highly attractive, visibly and audibly, and more readily recognizable alike when near at hand and from afar. But such speculations are fanciful and far-fetched. Experiments upon sensation, therefore, yield but little positive evidence in favour of the theories proposed to explain or generalize the nature of secondary sex characters.

One case alone yields evidence whose theoretical import is not entirely negative. This is the defect in visual sensation known as colour-blindness. In its commonest forms colour-blindness appears as an inability to distinguish red from green. Colour-blind persons are nearly always males. In European countries it has been estimated that over 4 per cent. of the male population are colour-blind; and only 0·5 per cent. of the female population. Such persons may transmit the defect to their male posterity; but, with rare exceptions, not to their female posterity. The unaffected women, however, may transmit the affection to their sons. The unaffected males never transmit it. It seems extremely probable that colour-blindness follows what are known as Mendelian laws of inheritance. Like horns in sheep, like orange-coloured coats in cats, colour-blindness in man appears "dominant" in males and "recessive" in females.[2] "These phenomena," as contemporary biologists have pointed out, "suggest that maleness and femaleness are in reality a pair of Mendelian characters." The alternative inheritance of exclusive sex-characters, as we have already seen, constitutes the problem which the five theories enumerated above can only meet with hypotheses devised *ad hoc*; here, however, we have an indication that it may readily be solved by the application of biological principles now recognized. Thus, the female we might regard as a hybrid in whom maleness is latent—suppressed by a prepotent factor which makes her definitely female; the male we might regard as a pure male—male because he is without this further factor. "From the results of castration-experiments we are led to a similar view; for castration of the male vertebrate, on the whole, leads merely to the non-appearance of male features, while injury or disease of the ovaries may lead to the assumption of male characters by the female."[3] Further investigations will doubtless show that such statements will have to be qualified by more complicated formulæ. It seems, however, probable that it is upon these lines that the explanation of the partial or complete incompatibility of sex-characters must be explained. And it is of especial interest to note that the clearest case in man is connected with processes essentially psychological, namely, visual sensations of colour.

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[1] Helen Thompson, *loc. cit.*, p. 176. So Wreschner, "Vergleichende Psychologie der Geschlecter"; *Wissen und Leben*, IV Jahrg., 12 Heft (Marz, 1911) S.737.

[2] Bateson, *Mendel's Principles of Heredity*, p. 172.

[3] Bateson, *loc. cit.*, pp. 191-2.

1b.—Simple Motor Processes. In comparing tests of simple motor processes with those of simple sensory processes, the correlations with intelligence are found to be somewhat larger; the sex-differences, at any rate in our own experiments, are again reduced inversely.

Perhaps the simplest test of movement is *Tapping*. The subject is required to tap as fast as possible with a pencil, or other instrument, for a limited period of time (15 seconds); and the number of taps executed is taken as the measure of his speed. The boys were found to be considerably quicker, the sex-difference being +19·8 per cent. With the tapping test, Miss Thompson's results yield a much larger sex-difference in the same direction, namely, +38 per cent.; in her series no other test shows a larger sex-difference than this. In *Dealing*, the sex-difference (+5·8 per cent.) is considerably smaller. Dealing is a more complex and difficult process than simple tapping; but its speed in different individuals is undoubtedly influenced by previous practice with cards. This somewhat obscures its correlation with intelligence, and probably has unduly diminished the degree of sex-difference.

The quickness with which a single movement is made in response to a single stimulus may be measured by means of a special apparatus. The *Simple Reaction-times* thus measured are processes of a less mechanical nature than repeated tapping. With a Wheatstone-Hipp chronoscope Miss Thompson measured the time taken by her subjects to react to light and to sound. The sex-differences are +18 per cent. and +21 per cent. respectively. The men were thus quicker in reacting than the women.

With a lighter, portable instrument, known as a d'Arsonval chronometer, an instrument which can be carried to schools and other institutions, and which measures accurately to $\frac{1}{100}$ second, one of us measured reaction times to sound and touch of a number of children and adults. The results so far obtained correspond with those given by Miss Thompson.

TABLE III.—**PERCEPTUAL, MOTOR, AND ASSOCIATIVE PROCESSES.**

(73 Oxford and Aigburth School Children.)

Test.	Reliability Co-efficient.	Correlation with Intelligence.	Median of Boys.	Median of Girls.	Percent'ge of Boys exceeding Median of Girls.	Excess of Percent'ge over 50 per cent.
					per cent.	per cent.
Touch Discrimination..	·74	·04	33·3 mm.	18·0 mm.	2·3	−47·7
Weight Discrimination.	·68	−·16	8·5 g.	12·5 g.	2·0	−48·0
Comparison of Lines ...	·52	·23	4 mm.	[6 mm.	81·1	+31·1]
Pitch Discrimination ...	·67	·38	6·0 vib.	4·9 vib.	21·0	−29·0
Tapping	·51	·45	86·5 taps	80·5 taps	69·8	+19·8
Card Dealing	·84	·36	27·5 secs.	28·2 secs.	55·8	+ 5·8
Card Sorting	·61	·54	45·3 secs.	43·5 secs.	37·2	−12·8
Memory	·81	·67	132 marks	221 marks	12·6	−37·4
Mirror	·52	·60	335·3 secs.	[437·5 secs.	81·4	+31·4]
Alphabet	·54	·70	86·5 secs.	[70·5 secs.	18·6	−31·4]
Irregular Dotting ...	·86	·72	94 dots	[98 dots	39·0	−11·0]
Spot Pattern	·52	·75	51 attempts	[64 attempts	65·5	+15·5]

2.—Complex Perceptual and Motor Processes. Tests of sense-perception may be made more complex by elaborating the process of comparison which most of them to some extent involve. When this is done, the intelligence coefficient is generally increased and the sex-difference simultaneously diminished.

Thus, instead of requiring the subject tested to divide a line into two equal halves we may require him to cut off a third, to cut off a quarter, or to cut off a portion bearing the same proportion to the remainder as is exhibited by a different line already divided in a given proportion. The correlations with intelligence are then progressively enlarged; the sex-differences progressively diminished. A reference to Tables IV and V will show that, though the tests yield poor reliability coefficients, this double result was obtained independently both in the Wallasey and in the Liverpool (Holt School) groups.

Tests of movement may be complicated in a similar way. The speed of reaction may be measured, not only when made in response to a simple sensory stimulus, but also when involving a more complex mental process, such as recognition, discrimination, memory, or thought. Measured upon children in the same way as the simple reaction times, we find that the sex-differences are somewhat reduced; the girls now show superiority quite as often as the boys.

Serial processes, such as Tapping or Dealing, may readily be modified to test complex motor processes. Thus, the children may be required to tap a long series of irregularly-printed dots; or to sort the cards according to colour as they deal them. With the Oxford and Aigburth groups the sex-difference in *Irregular Dotting* is −11 per cent. (the apparatus used, however, was slightly different in the two cases), and *Card-Sorting* −12·8 per cent. With the Wallasey group the sex-difference in the former is −23·2 per cent. (or when repeated with slightly different method, for both sexes −35·1 per cent.), and in the latter −34·5 per cent. Here, therefore, the reduction in sex-difference is not constant. Miss Thompson's card-sorting test also gave a large sex-difference, −36 per cent. The *Alphabet Test* (picking out letters in order of the alphabet from irregularly-arranged sets) is a compound reaction test yielding a correlation with intelligence of a higher order. With the Holt School groups this yields a sex-difference of −12 per cent.; with the Wallasey group, one of 9·7 per cent. After applying it to the Oxford boys, and before applying it to the Aigburth girls, the technique of the test was improved. Subsequent introspections showed that this alteration favoured the girls. Hence, the sex-difference among these groups appears unduly large, −31·4 per cent.

Writing and *Reading*[1] may also be regarded as tests of controlled movements of the same order. Tested by speed these processes furnish distinct but rather small correlations with general intelligence, and distinct and rather large sex-differences in favour of the girls, namely, −30 per cent. and −36 per cent. respectively. The speed of *Counting* shows analogous results.

The *Mechanical Puzzles* (wire puzzle, dissected blocks, and jig-saw picture postcards) involve processes of a higher order. Like the mirror test, presently to be described, they involve essentially the semi-intelligent procedure known as "trial and error." But, since they were not continually repeated, they involved the formation of no new habits or associations. Their intelligence correlations are somewhat higher than those of reading and writing, and their sex-differences somewhat smaller. As in the mirror test, the boys appear considerably quicker. This harmonizes with the results of Miss Thompson's mechanical puzzle tests—classed by her as tests of "ingenuity." She believes that the essential factor was the greater mechanical interest on the part of the men. We cannot, however, agree that this is the only factor at work.

Thus, while males are markedly superior in simple mechanical movements, females are markedly superior in compound and controlled movements, at any rate as far as the speed is concerned. With regard to accuracy, precision and ingenuity, Miss Thompson's figures and our own suggest a sex-difference in favour of males. It is clear that the results of the tests of movement, simple or controlled, are considerably affected by differences in interest, training and experience. If this is allowed for, the evidence points on the whole to a somewhat smaller difference in the compound and controlled movements than in the simple and mechanical ones. The indications, however, are by no means decisive.

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[1] Speed of reading was first experimentally measured by Romanes, who also found women distinctly superior. ("Mental Differences between Men and Women," *Nineteenth Century*, May, 1887.)

Two of the more complex tests applied to the Oxford and Aigburth groups were originally devised by Dr. McDougall as tests of attention. The Spot Pattern test may be regarded as a test of *Scope of Attention;* the Irregular Dotting test, when carried out for a prolonged period, may be regarded as a test of *Maintenance of Attention.* In both these respects, men and boys appear to excel women and girls.

With the Oxford and Aigburth groups, the sex-difference in the Spot Pattern test is +15·5 per cent.; in the Irregular Dotting test, the figure given in the table (−11·0 per cent.) represents the sex-difference when the dotting is carried on for a short time only; when the period is prolonged, rough experiments in other groups show that the superiority is transferred from girls to boys; the sex-difference changes to about +20 per cent. Of the higher tests these two form the most prominent exceptions to the rule that the largest intelligence coefficients correspond with the smallest sex-differences. It is therefore particularly unfortunate that our procedure in carrying out these tests was extremely defective. Many other investigators, however, have recorded similar inferiority in scope and maintenance of attention in women and girls.[1] The existence of such a difference also harmonizes with what is known of the differences in mental pathology of the two sexes, especially with the greater frequency of various forms of hysteria, of split consciousness, dissociated personality, and mental conflict among women.

There seems to be little doubt that in conscientiousness and in patience, in industry and in power mentally to resist the discomforts and fatigue to which physically they are more liable, women are superior to men. The reason, therefore, for their deficiency in breadth and sustenance of attention we must seek either in their training and traditions, or else in their poorer physical strength and their richer emotional life. To this deficiency in 'application' (that is, in the power continuously to sustain voluntary attention at it maximal concentration), we should incline to ascribe the alleged quantitative inferiority in the productive power of women.[2] We do not, however, feel satisfied that either characteristic can be regarded as established without further research.

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[1] cf. esp. the suggestive chapter on the limited span of consciousness and secondary (i.e., subconscious) functions in woman, in Heymans, *Die Psychologie der Frauen*, pp. 42-60; also H. Campbell, *Differences in the Nervous Organization of Man and Woman*, esp. chaps. ix-xi, "Varieties of Weak Will." In the text, the word 'hysteria' is not used in its popular sense, though in this sense also hysteria has been described as 'femininity carried to extreme' ('la gigantessa della femminilité'). I use it rather in the sense familiarized by the writings of Janet and Freud.

[2] cf. Sidney Webb, "Alleged Differences in Wages," *Economic Journal* (1891). "The facts . . . suggest that the frequent inferiority in women's earnings is due, in the main, to a general but not invariable inferiority of productive power, usually in quantity, sometimes in quality." He adds, however, that "to the employer of women's labour the attraction is often less in its actual cheapness than in its 'docility' and want of combination. . . . And one might not improbably find that there is no special women's question in the matter."

3.—**Association Processes.** The results of the Memory tests and Mirror tests may be taken as measuring the facility with which new associations are formed.

The Mirror experiments test associative processes upon the active side; the Memory experiments test them upon the receptive side. With the Oxford and Aigburth group the *Mirror test* gives a large sex-difference in favour of the boys. With the groups of children and with most groups of adults the sex-differences have usually been in favour of the women and girls. Further considerations suggest that this test depends considerably upon several varying factors: several of the boys in the Oxford group had practised mirror-drawing as a game; many of the girls, and especially the women, were doubtless familiar with the manipulation of objects seen only in a mirror.

The results of the *Memory tests* are by no means so uncertain. Feminine superiority is a constant phenomenon in memory tests of every kind. It matters little what the age or training of the subjects may be. Hence, it is one of the best attested sex-differences; and one of the most likely to be innate. It doubtless underlies the characteristic so commonly observed by teachers, viz., that girls and women "assimilate" so much more rapidly than boys or men.

TABLE IV.—**PERCEPTUAL AND ASSOCIATIVE PROCESSES.**

(65 Liverpool, Holt School, Children.)[1]

Test.	Reliability Co-efficient.	Correlation with Intelligence.	Median of Boys.	Median of Girls.	Percent'ge of Boys exceeding Median of Girls.	Excess of Percent'ge over 50 per cent.
					per cent.	per cent.
Bisection of Lines ...	·15	·08	15·1 mm.	17·2 mm.	61·8	+11·8
Trisection of Lines ...	·17	·19	31·0 mm.	32·5 mm.	57·2	+ 7·2
Addition	·50	·25	93 figures	82 figures	65·0	+15·0
Multiplication	·55	·41	108 figures	102 figures	63·0	+13·0
Writing...	·89	·42	1021 letters	1064 letters	36·4	−13·6
Questions	·83	·35	86 answ'rs	90 answ'rs	33·3	−16·7
Free Associations ...	·81	·13	88·5 words	94·5 words	45·5	− 4·5
Completion of Sentences	·61	·62	83 marks	78·7 marks	58·0	+ 8·0

The foregoing tests measured the speed with which new associations are created. The following measure rather the speed with which old associations are reproduced. Here the sex-differences tend, on the whole, to favour the boys.

The best known and best elaborated test of reproduction is that known as *Free Association.* A standard list of words is presented to the subject, word by word; and he is required to reply as quickly as he can with the first word that each brings to his mind. The speed is measured for each response by the d'Arsonval chronometer, or for the whole series by the number of replies written in a given time. Our results agree with those of continental investigators, who have exploited this test for many purposes. The males are far quicker than the females.[2] At the Wallasey School the sex-difference is +35 per cent. With *Restricted Associations* the sex-differences are much smaller. The subject may be required to reply, not with the first word that occurs to him, but only with the opposite of the word called out; or he may be required to give the answers to simple questions requiring no special thought or information, to simple addition and multiplication sums, to more complex mathematical problems. With each further complication and restriction of the mental process involved, the intelligence coefficients tend to increase, and the sex-differences to diminish. (See Table V.)

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[1] A large number of tests carried out at this School and applied on a larger and more careful scale to the Wallasey School Children have been omitted from the above Table. There are no serious discrepancies between the results obtained from the two schools. For these tests the more reliable results, therefore, are here alone recorded, and will be found in Table V.

[2] cf. Wreschner, *loc. cit.*, p. 742.

A curious sex-difference is the general superiority of boys and men in tests involving arithmetic or mathematics. This accords with the results of many other investigators. Analogous observations have often been cited in evidence of the incapacity of women for abstract or rational thought. Such inferences we believe to be erroneous. The superiority of the boys is greatest where the process is most mechanical. It has even been said that the scientific field in which women have attained greatest success is that of higher mathematics, and the mathematical departments of physics. It was, indeed, on such grounds as these that Buckle described women as the deductive sex. Such generalizations, of course, have but little psychological value, unless supported by experimental or statistical evidence.[1]

Memories reproduced through associations are revived in various forms. Individuals differ considerably in the form to which they naturally tend. These differences are described as differences of *Imagery*. Some recall their past experiences in terms of concrete sensory detail of the actual experience itself; others recall them by means of abstract symbols, such as words. Further, thinking thus by means of words, some tend to utter the words with their lips, or at least to feel the movement in imagination; others tend to hear them spoken; others, again, to see words printed, or to feel their hands writing them. Again, in thinking by means of concrete imagery, some picture the objects as present to their mind's eye; others feel their touch; others tend more easily to imagine sounds, and others movements.

Various tests have been suggested for measuring the vividness of the visual, auditory, motor, and tactile imagery of different individuals. For instance, a series of objects may be shown, a series of noises made, a series of movements executed; and the subjects who have seen, heard, or felt these presentations, may be required to write down as many as they remember. Or again, they may be questioned according to a prearranged scheme as to the vividness with which they can imagine certain experiences; and required to arrange the experiences in a corresponding order. These and several other tests have been applied to a group of about sixty boys and girls in a Liverpool Elementary School.[2]

The reliability of the tests of the former kind (i.e., objective tests) is low, averaging about ·38; the reliability of the tests of the latter kind (i.e., introspective tests) is high, rising to ·72, and even ·89. The correlation between the results of an objective test and the corresponding results of the introspective methods is about ·50. The introspective data, however, do not lend themselves so well to quantitative manipulation. On the basis of the objective tests it is found that the proportion of boys exceeding the median of girls is in visual memory 25 per cent., in auditory memory 65 per cent., in motor or kinæsthetic memory 69 per cent.; giving sex-differences of − 25 per cent. + 15 per cent, and + 19 per cent. respectively. The salient features of these results is the superior powers of visualization possessed by the girls.[3]

The part played by imagery in the process of thought has, it is now generally believed, been over-estimated in the past. In our own investigations the introspective evidence both of students and of adults of the uneducated and business classes has led us to believe that differences in imagery, although perhaps of negligible importance in purely intellectual processes, have some influence upon so-called moral characteristics. Thus, many who are constant and faithful to their friends refer this characteristic, in part at any rate, to their power for visualizing the persons of their friends. Others refer their apparent changefulness to weakness of visual imagery. With the non-visualizers, to be out of sight means also to be out of mind; for their mind's sight is poor. Again, the power to visualize may facilitate the power mentally to see ourselves as others see us, and thus to favour the development of habits of self-consciousness and self-respect, personal dignity and personal grace. One or two individuals, whose behaviour is younger than their years, explicitly refer this peculiarity to the fact that they still visualize themselves as children or young people usually as of the age at which their visual powers commenced to decay. Neat habits, not only in person but in general, are often characteristic of the visualizer. Finally, the person who in the activities of his business forms his concrete decisions, recollections, judgments and plans with speed and confidence commonly explains that he formed them in visual terms; and investigation may show, not perhaps that he possesses visual imagery of unusual vividness, but that he certainly can summon up visual memories and schemes and manipulate them in thought with great rapidity and ease. In abstract and reasoned thought, on the other hand, vivid visualization, especially if spontaneous and relatively uncontrollable, is often said to prove a hindrance and a distraction.

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[1] For the sex-differences in intellectual proficiency as exhibited by the relative achievements of children and adults in scholastic and academic subjects, see the summary of the results of circulars sent to schools and universities in various countries, in Heymans, *Die Psychologie der Frauen*, pp. 107-156. "Die Intelligenz."

[2] For the following data we are indebted to a research, as yet unpublished, by Mr. J. A. Davies.

[3] This agrees with the results of earlier investigators e.g., Galton, *Inquiries into Human Faculty* (1883), p. 99. Miss Thompson's questionary revealed "no greater use of visual imagery by the women as against the men" (*loc. cit.*, p. 165). Questions as to imagery in the memory tests, however, showed men predominant in auditory imagery, women in visual and kinæsthetic (p. 98).

Correlations calculated from the results of experimental tests and personal impressions of school children partly verify these speculations. Thus, vividness of visualization correlates with general neatness to the extent of ·25; with fidelity to the extent of ·19; with personal neatness to the extent of ·16; and with powers of literary composition to the same extent. With "general intelligence," however, it shows a small negative correlation —·17. If we "correct" for the unreliability of the several estimates, these correlations become enormously increased.

We believe that many of the moral characteristics popularly ascribed to women—neatness, fidelity, self-respect, personal vanity and personal grace, love of adornment, histrionic, narrative, and literary power, practical ability, rapid "intuition" in concrete matters, relative incompetence in abstract matters, are largely referable to their greater tendency to vivid visualization. Material for the study of these complex characteristics has been collected on a large scale for children in this country, and for both adults and children in Holland.[1] The data consists of gradings based on personal impressions; the children were graded in two or more classes by their teachers, the adults by their doctors. It is extremely improbable that such popularly conceived capacities as are here studied ("self-consciousness," "popularity," "vanity of person," "literary gifts," and other characteristics accessible to observation in everyday life) can be inherited in the manner suggested by these investigators. They are far too superficial and far too complex. If, however, we analyze them into more elementary and more fundamental peculiarities, such as capacity for visualization or tendencies towards specific emotions, we can more easily postulate an innate structural basis for them. We may conceive peculiarities in visualization to be conditioned by peculiarities in the constitution of the visual area of the brain, peculiarities in specific emotions to be conditioned by peculiarities in the congenital psychophysical dispositions underlying the correlated instincts, or in the centres governing the visceral and glandular activities whose disturbance forms the essential feature in emotional reactions. Such analysis therefore enables us more easily to picture the material conditions of sex-limited inheritance in these characteristics.

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[1] K. Pearson, "On the Inheritance of Mental and Moral Characters in Man," *Biometrika*, Vol. III, Pt. II (1904). G. Heymans, *Die Psychologie der Frauen* (1910). The data were originally collected for the study of inheritance. The more important results have been further elaborated statistically by Professor Thorndike and published in his *Educational Psychology*, Chap. III "The Influence of Sex."

TABLE V.—REASONING AND OTHER PROCESSES.

(130 Wallasey School Children).

Test.	Average Reliability Co-efficient.	Average Correlation with Intelligence.	Median of Boys.	Median of Girls.	Percent'ge of Boys exceeding Median of Girls.	Excess of Percent'ge over 50 per cent.
					per cent.	per cent.
Touch Discrimination ...	·71	·05	35·3 mm.	20·4 mm.	12·6	−37·4
Bisection of Lines ...	·21	·07	3·0 mm.	4·5 mm.	71·2	+21·2
Trisection of Lines ...	·20	·10	11·0 mm.	16·0 mm.	68·4	+18·4
Card Dealing	·64	·27	25·4 sec.	25·0 sec.	47·7	− 2·3
Card Sorting	·83	·15	48·2 sec.	44·0 sec.	15·5	−34·5
Irregular Dotting (free-hand	·66	·01	105·2 sec.	93·0 sec.	14·9	−35·1
Irregular Dotting (controlled)	·62	·14	97·8 sec.	90·5 sec.	26·8	−23·2
Reading (Mass Test) ...	·46	·00	231 words	315 words	11·3	−38·7
Reading (Individual Test silently)	·69	·22	166·0 sec.	134·6 sec.	17·9	−32·1
Reading (Individual Test aloud)	·81	·29	211·8 sec.	186·4 sec.	13·4	−36·6
Counting	·77	·30	67·4 sec.	64·0 sec.	20·0	−30·0
Alphabet	·70	·25	100·4 sec.	95·9 sec.	40·3	− 9·7
Wire Puzzle	·30	·11	158·5 sec.	188·0 sec.	72·3	+22·3
Reconstructing Pictures (Blocks)	·75	·42	113·0 sec.	140·4 sec.	77·6	+27·6
Reconstructing Pictures (Postcards)	·74	·36	154·9 sec.	151·9 sec.	47·7	− 2·3
Free Associations ...	·73	·48	65·5 words	56·0 words	85·0	+35·0
Symbolical Problems ...	·71	·47	17 correct	15 correct	62·0	+12·0
Completion of Story ...	·58	·52	186 marks	174 marks	81·0	+31·0
Opposites (Individual Test)	·74	·44	39·0 sec.	36·5 sec.	29·2	−20·8
Opposites (Mass Test) ...	·71	·62	53·2 words	55·1 words	42·2	− 7·8
Completion of Analogies	·71	·50	53·5 marks	58·1 marks	35·0	−15·0
Completion of Argument	·58	·64	124 marks	116 marks	56·6	+ 6·6

4.—Reasoning Processes.—But little attention has been paid by psychologists to the measurement of the processes of judgment and of inference. The following tests may perhaps be regarded as tests of "reasoning" as thus understood:—Completion of an Argument, Correction of Syllogisms, Completion of Analogies, Completion of Sentences, and, perhaps, Completion of Opposites.

The Nature of these tests is as follows:—

(1) **Opposites.**—A series of selected words is presented to the child; and he is required to give the opposite of each. In mass tests, the words are given to him as a printed list; and he writes down as many opposites as he can in a given time. In individual tests, the words are printed on cards; and he calls out the opposite to each word as he deals out the card; either the time taken to call out a given number is measured with a stop watch, or the time taken for each one is measured with a d'Arsonval chronometer.

(2) **Analogies.**—This test, known to some as the "Mixed Relations" test, was carried out by an analogous procedure. Each line on the list, and each card dealt, has, instead of a single word, three words arranged thus:—

SUNDAY is to SATURDAY as JANUARY is to..................?

The child has to write down, or call out, a word standing in the same relation to the third word as the second does to the first. The number written, or the time taken, is measured as before.

(3) **Syllogisms.**—Series of simple Syllogisms are given to the child thus:—

One of the children in the class must get the prize;
I am one of the children in the class;
Therefore, I must get the prize

In some series, certain of the conclusions are wrong; and the child has to distinguish the right from the wrong, either by marking them differently, or by dealing them into different heaps. In other series, conclusions or premises are omitted, and have to be supplied.

(4) **Sentences.**—Pairs of words are given to the child and he has to combine the two words in a sentence expressing the closest possible connexion between the two ideas.

(5) **Argument.**—A passage of prose (in the argument test a simple, but rigid, piece of reasoning from Bacon's Essay on *Revenge*; in the story test, Stevenson's Fable of *The Two Matches*) is given to the child with words left out at critical points; the child has to fill in the missing words as best he can, so as to complete the sense of the argument (or story). The papers were marked according to a table based on a comparison and numerical evaluation of all the words suggested by all who have ever attempted the test.

Both at the Holt Secondary School and at the Wallasey Higher Elementary School (when repeated there) these tests gave correlations with intelligence of ·50 or over. Except the Analogies (which yield a sex-difference of 15 per cent. in favour of the girls at the Wallasey School), and the Opposites when tested individually by dealing cards (when, like card-sorting, it yields a large sex-difference, 20·8 per cent., in favour of the girls at the same school) none of the tests gives sex-difference of any appreciable size. The figures are in every case under 10 per cent. (See Tables IV and V above, and Table V, Vol. 1, No. 2.

In their present form the Completion of Sentences and the Correction of Syllogisms were found unsuitable for repetition at the Wallasey School. At the Wallasey School the Completion of a Story gave an intelligence coefficient of ·52, and the Solution of Symbolical Problems (which has also some claim to be considered as a test of reasoning) gave a correlation nearly as high. The last test was not employed at the Holt School. Its nature is as follows. A number of simple problems involving the use of letters were given to the children, e.g., "What is the price of x oranges at tenpence a dozen?" The children were required to work the problems "mentally," and to write down the answers opposite the several questions. Unlimited time was allowed, and the papers were marked for accuracy.

The Story test gave a sex-difference of 31 per cent., and the Problems test one of 12 per cent., in favour of the boys. It is easy to explain these differences away. The story chosen presented the case of a horseman in California eager for a smoke; and may have appealed to some special knowledge or interest on the part of the boys. The problems may have elicited the mathematical interest and ability that seems to characterize the boys.

The slight superiority of the Wallasey boys in the best reasoning tests (Completion of an Argument) is counter-balanced by an equal superiority of the Holt girls; and, although the former is based on larger and more careful results, yet the differences between the medians for the two sexes ($124-116=8$ marks) is scarcely three times its probable error ($\pm$ 2·9). We cannot therefore assert any clear superiority on the part of the boys in the processes of reasoning.

None of Miss Thompson's tests dealt with reasoning processes. An investigation into the reasoning ability of American school-children has recently been carried out under the supervision of Professor Thorndike.[1] The results confirm our own. Except in the tests of spelling, of mathematical judgment, and of power of literary interpretation (which depend primarily upon other processes than reasoning) the sex-differences are again all below ± 10 per cent. Table VI gives the correlations of the several tests with general ability, estimated by performances in all the tests amalgamated, and the degrees of sex-difference averaged from the figures for the several grades.

TABLE VI.—**REASONING PROCESSES.** (757 American Children).

Test.	Intelligence Coefficient.	Percentage of boys exceeding median of girls.	Excess over 50 per cent.
		per cent.	per cent.
Spelling	·22	39	− 11
Literary Interpretation ...	·37	39	− 11
Completion of Sentences ...	·55	56	+ 6
Correction of Definitions ...	·58	54	+ 4
Mathematical Problems ...	·59	66	+ 16
Correction of Reasons ...	·73	51	+ 1
Opposites	·85	41	− 9

The writer concludes that, in reasoning abilities, "on the whole, the resemblances between the sexes are far greater than the differences." On analyzing the results for the several groups according to age and school grades, he believes that, in the literary, mathematical, reasons,[2] and opposites tests, "we have evidence emphasizing native capacity," rather than school training, as the main influence determining sex differences.

One other research concerned with higher mental processes deserves citation here. The children tested were boys and girls in the Höhere Mädchenschule and Oberrealschule at Freiburg, in Germany. "The selection of persons for the experiments was guided by the intention to obtain the most comparable material possible for both sexes." The experiments applied were intended to test critical observation and suggestibility (description and discussion of pictures), attention and distraction (simultaneous reading and writing), memory (learning figures), and power of combination (completion of prose passages). The boys are better at the completion test, and show greater self-criticism; the girls reveal wider interests and better literary style. In suggestibility, attention, and memory for figures there appears to be no sex-difference. The writers conclude, "In general, the following may be regarded as established: There is no general superiority on the part of the male sex, as is often asserted; rather, specific instances of masculine superiority are counterbalanced by specific instances of feminine superiority." The figures given show that with one exception (namely, critical tendencies of the boys as shown by the frequency with which their answers, especially their erroneous answers, are given with explicit reservations), the sex differences are extremely small.[3]

In the application of Reasoning tests to adults we have found, as a rule, a slight superiority among the men. This superiority appears small enough to be explicable as an acquired difference—the product solely of training and tradition, of home and school education. On the other hand, it is equally possible that it may, at any rate in part, be due to a congenital difference congenitally determined, but manifested mainly towards the end of the period of growth. Under any circumstances the innate difference must be far smaller than pre-experimental psychologists have commonly assumed. According to one of these earlier writers, however, the difference in reasoning capacity between the two sexes is a difference in kind rather than a difference in degree. Women, asserts Buckle, reason deductively; men, inductively. Women start from ideas; men, from the slow collection of facts. The apparent intellectual inferiority of women, in all but the lower social classes, he assigns to the impairment of a mind, naturally fine and nimble, by "that preposterous system called their education."[1] Our experiments have frequently seemed to support this statement, though not in the extreme form which Buckle gives it, nor, as yet, with any evidence that can be reduced to quantitative form.

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[1] Bonser, *The Reasoning Ability of School Children* (Columbia University, 1910).

[2] The marked superiority at correcting reasons among the boys of three grades out of the five is perhaps unduly obscured by averaging. It nowhere, however, exceeds 10 per cent.

[3] Cohn und Dieffenbacher, *Untersuchungen uber Geschlechts, Alters, und Begabungs-Unterschiede bei Schulern* (1911), p. 169 seq.

General Tendencies.—We have reviewed a long series of experimental tests, dealing so far mainly with the cognitive and motor sides of mental life. We have seen that none of the sex-differences revealed by these experiments are as large as those revealed by measurements of physical characteristics, such as height or strength. The nearest approximations to the physical differences, the largest mental differences of all, are those on the lowest levels, such as those in touch discrimination and speed of mechanical movement. As we ascend the various levels of mental processes, the sex-differences become for the most part smaller. On the highest levels of all, those of reasoning, they appear relatively insignificant. There is therefore no evidence whatever to support the theory that the higher the function tested, the more the sexes diverge. The evidence, both from our own tables and from those compiled from the data of other observers, contradicts it. So far as any generalization of this sort is valid at all, it is the reverse.

To this, however, there are clearly many exceptions. Our attempts to explain them away remain, for the most part, speculations. We need therefore a measure of the truth of this assertion—a figure which shall express in quantitative form the degree to which the amount of sex-difference varies inversely with the complexity or importance of the function tested. The following method is available. The several tests may first be arranged in order of their correlation with intelligence; they may then be arranged in inverse order of the figures measuring sex-difference. Between these two orders a coefficient of correlation may be calculated in the usual way. At the Wallasey School—the group providing the most numerous and the most reliable results—this coefficient proves to be $+\cdot 50$. Two of the tests, however, the mechanical puzzle and the bisection of lines, yield reliability coefficients far below those given by the others, $\cdot 30$ and $\cdot 21$. We ought therefore to "correct" the intelligence coefficient of these tests according to recognized formulæ. The inverse correlation between the corrected intelligence coefficients and the sex-differences then becomes larger still. If we leave them out altogether, the correlation based on the remaining nineteen tests rises to $\cdot 65$.

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[1] Buckle, *Miscellaneous Works*, Vol. I, "The Influence of Women on the Progress of Knowledge."

There is, therefore, a high correlation between the size of sex-difference and the simplicity of the capacities compared. The higher the process and the more complex the capacity, the smaller, on the whole, become the sex-differences.

In calculating this coefficient, only the size of the sex-difference has been considered ; its direction or sign is ignored. We may, however, take this into account in arranging the tests according to sex-differences. We may, for instance, place the tests showing the largest male superiority (positive signs) at the top, and rank them in order till we reach tests showing no sex-difference either way (zero) ; and then continue with the tests showing the smallest female superiority (negative signs), and rank them in order till we reach the largest. When this is done for twenty-one tests applied to the Wallasey group, the correlation rises from ·50 to ·55 ; compared with the probable error, however, the alteration is of little significance. But if the two unreliable tests be omitted, the correlation rises from ·65 to ·87. This suggests a more subtle formulation of the general tendency ; in the lower levels the sexes show divergencies in favour of the females ; as we ascend the divergencies diminish ; but before reaching the highest levels superiority crosses over, and the sexes once more reveal divergencies in favour of the males. The instance of male superiority in the highest levels, however, are so few, and, compared with their probable errors, so small, that such a generalization appears at present ill-established, and when we turn to other groups we find that the directions of the smaller sex-divergencies do not always correspond ; and, further, that at some of the lowest levels, untested at the Wallasey School, large differences in favour of the male were also found.

It seems therefore that the only generalization we can regard as at present established is the wider and cruder one, namely, that the differences on the higher levels are in the main smaller than those on the lower.

B. Emotional Activities.

The foregoing conclusion so far is demonstrated only of practical and intellectual processes. In everyday activities, however, mental behaviour is determined largely by emotional capacities. The significance of emotion has only been recognized of late. Educational psychology has recently emphasized the importance in school work of interest. Social psychology has recently emphasized the importance, even in after life, of the primary instincts upon which interests have been built up. Pathological psychology has recently shown that the affective and conative aspects of mental life may be far more important in determining the aims, the energy, and the efficiency of an individual than the cognitive. Nevertheless, in tests of mental efficiency these aspects have been almost entirely neglected. Full and excellent as it is, Dr. Whipple's *Manual of Mental Tests* does not contain a single test of emotional capacities or experiences. The interest of psychologists has for long centred almost exclusively in tests of "general intelligence."

In carrying out our simple practical and intellectual tests we have endeavoured, as far as possible, to keep interest at a maximum, and emotion minimal and uniform. In the execution of the tests, particularly in the speed tests among adults, this has not been possible. In the results of the tests, as we have already noted in our descriptions, emotional tendencies have frequently intervened to affect the performances of the subjects ; and the two sexes have been affected by such influences in different degrees.

Vast differences in the nature and intensity of the emotions are currently ascribed to the sexes. There is, perhaps, no point upon which popular opinion and the opinion of the expert are in such complete agreement. The best expression of this view is that of Dr. Heymans.[1] By means of questionnaires he has collected the opinions of some doctors in Holland as to the various mental characteristics of the members of families with whom they are personally acquainted. He has given these opinions a statistical formulation, and on the basis of the results decides that the innate characteristics of women underlying the differences thus indicated are—(1) a stronger emotionality and (2) a greater activity, probably (3) a stronger moral disposition, and (4) a greater tendency to "secondary" functions, that is, subconscious or implicit mental processes. The latter three are reducible to the first as the most fundamental and the most marked. It appears that in general emotionality only 30 per cent. of the men exceed the median of the women. This represents a sex-difference of 20 per cent.

With this opinion earlier labaratory experiments on sex-differences appear at first sight to disagree. In earlier researches emotional disturbances have commonly been investigated by recording their effects upon such organic processes as *Respiration* and *Circulation*. Investigators have preferred to diagnose emotions by the 'method of expression.' Apparatus has been devised for recording the alteration in the pulse, in the rate of breathing, and in the volume of blood within a limb, consequent upon the excitement of emotions. This method has been employed by Miss Thompson in studying the differences between men and women in their affective processes. The number of individuals showing slight, moderate and violent changes in respiration and circulation, when excited in various ways, is given in the following table :—

TABLE VII.

Emotional Changes in Circulation and Breathing.

(48 American students.)

	Violent.	Medium.	Slight.
Men	10	6	7
Women	6	8	11

The conclusion drawn is the following: "If, as is supposed, the amount of change runs parallel with the degree of emotional disturbance, the result means that the men had slightly more intense affective experiences than the women." On the basis of a series of questions on personality a writer adds: "As to the character of the affective processes themselves, the most striking thing is their close coincidence in both sexes." The conclusions are in amazing contradiction to the opinion generally received. Miss Thompson, however, believes they are in harmony with "the attributes of patience, self-control, and power to endure pain, and with the much smaller share in the grand passion (i.e., sexual love) which are also ascribed to women."[2] They are also in apparent harmony with the fact that women have never excelled in lyrical poetry, or in any conventional branch of emotional expression. Nevertheless, we incline to connect the results obtained with physiological methods rather to the superior muscular activities of man. Internally, the emotions of men may, perhaps, be broader, more profound, and more prolonged; but externally, in their superficial expression, the emotions of women are more sudden and more intense. A man's emotion is like a ground swell, vast, steady, and inconspicuous; a woman's emotions are like the ripples and the waves, noticeable, but transient and shallow. With these fancies our results to some extent tally.

In an investigation of emotional dispositions commenced by one of the writers the use of pneumograph and sphygmographs ("breath-recorders" and "pulse-recorders") was, at the outset, found highly unsatisfactory for comparative work.[3]

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[1] Die Psychologie der Frauen.

[2] "Recent Literature on the Psychology of Sex," *Psychological Bulletin*, Vol. VII, No. 10, p. 341.

[3] This is evidently the opinion of physiologists. cf. Schäfer's *Textbook of Physiology*, Vol. II, p. 112: "It must be remembered that the sphygmograph can never be applied twice in exactly the same way. This vitiates the instrument for comparative work." The same holds good of pneumographs, plethysmographs, and respirators.

The only apparatus used for the study of emotional disturbance by means of its external effects with any success is that recording the *Psychogalvanic Reflex*. The subject places the middle finger of each hand into a tube containing a liquid electrode: wires lead from these to a galvanometer which measures changes of current accurately to $\frac{1}{1000000}$ ampère; a single cell is placed in series in the same circuit; the use of resistance boxes and shunts compensates for the changes in the resistance offered by the body to the passage of the electric current, from subject to subject, or from sitting to sitting. The subject is stimulated through every available sense with pleasant and unpleasant stimuli; a pistol is fired; coloured lights shown; substances tasted or smelt; hot and cold objects applied to the skin; pictures of various kinds are exhibited; tunes played upon a harp or gramophone; words or questions calculated to arouse emotional ideas called out. With each emotional stimulus the needle of the galvanometer is deflected, showing that the resistance offered by the body to the passage of the current has been for a moment reduced. The cause of the reduction is unknown; it appears to be chiefly due to changes in the amount of sweat secreted in the surface of the fingers, increasing or decreasing the moisture of the skin. When proper compensations are made for variations in the condition of the apparatus, the correlation between the degree of deflection and the subjects' introspections range from ·50 to ·85; and the correlations between the average degree of deflection for the various individuals tested and their general emotional tendencies, estimated independently by their acquaintances, varies from about ·34 (men) to about ·60 (women).

On comparing the two sexes it is found that, with nearly every type of emotional disturbance, the deflections are greater (on an average) in the women than in the men. The sex-difference in a group of thirty adults is about −23 per cent. Owing to the obvious difficulties in the nature of the experiment we have been unable to obtain comparable results from children on any large scale.[1]

With the exception of the psychogalvanic reflex, we believe that the best tests of emotional dispositions are to be obtained by means of the method of "impression" rather than by that of "expression," that is, rather by the study of emotional influence upon such mental processes as attention, memory, recognition, preference and association than by the study of its influence upon physiological processes, such as respiration, circulation, or secretion.

"Ambiguous" pictures or words, that is, pictures or words which can be apperceived or attended to in two incompatible ways, have been exhibited for a brief instant to various individuals. Only one aspect of the presentation is perceived. An ambiguously-drawn puzzle-picture, Dana Gibson's *Vanity*, for instance, may be seen in one of two ways, either as a skull or as a girl; an ambiguously-printed word may be read either as a "sweet bread" or as "sweet heart;" but never as both at once. The particular mode of apperception often shows consistent and significant differences in the two sexes. Again, numerous pictures of men, women and children, and miscellaneous objects and situations appealing to instinctive interests are given to the subject; and he is required to arrange them in order of preference, or to pick out those which were shown him a few minutes before. Once more typical sex-differences are found. At very early ages, girls manifest a greater interest in persons, boys in animals and things; and somewhat later, girls manifest an interest in pictures of little children, boys in pictures of the opposite sex.

The test which lends itself most readily to our present purpose is the free association test. A simple form of this test is to require the subject to write down the first hundred words that come into his head. This test, which may be called the *Continuous Association* test, was applied by Professor Jastrow in a well-known investigation of the community of ideas of men and women, to

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[1] With this the results of a recent Swiss investigation obtained from a small group of 30 adults agree. I find on calculation that his data yield a sex-difference of about —15 per cent.—O. Veragult, "La phenomène psycho-electrique."—*Archives de Psychologie.*

American students, comprising twenty-five men and twenty-five women.[1] He found that there was greater community of thought among the women and greater variety among the men. Considerable differences of interests were also revealed. The words written by the men largely comprised the names of animals, implements, weapons, utensils; those written by the women largely comprised words referring to dress, amusements, arts, and education. We have repeated this test both with children and adults, and with children both of English extraction and of foreign (chiefly Hebrew and Chinese). The results roughly confirm those of Jastrow: the females are more personal and subjective in their interests; the males more impersonal and objective. We have endeavoured in some instances to make the conditions of the experiment more rigid by giving the same word to the subjects as a starting point, and by measuring and recording upon double revolving drums the rate and rhythm of utterance by means of a lip-key and a $\frac{1}{5}$-second chronograph. We thus obtain, as it were, a picture of the stream of thought. We find that its current shows far more frequent changes both in speed and in direction with women than with men. Women alter their themes and topics far more frequently than men; men, on the other hand, show a greater variety of associative connections between one idea and another within the same theme. The course of ideas is also more frequently disturbed in women by the various signs of "complexes" (systems of associated ideas characterized by strong emotional colourings).

Similar results are observed on examining responses obtained with *Discrete Association* tests. Here (as we have already described) a list of words is called out to the subject, and he is instructed to reply to each with only the first word that comes into his head. The time is recorded by a special apparatus.[2]

It is instructive to observe how the differences revealed by this test are related both to general intelligence and to general emotional temperament. Here we may cite results obtained from a special group of children, boys and girls, five to eleven years of age. Even at the youngest stage there are conspicuous sex-differences, both in the nature of the replies and the speed with which they are given.

The following are the figures for the speed of associations obtained from the larger and more reliable age groups.

TABLE VIII.

Emotional Processes. Associative Reactions. Time.

(250 Waterloo children.)

	Correlation with Intelligence		Correlation with Emotionality		Median		Percentage of Boys exceeding Girls	Excess over 50 per cent.
	Boys	Girls	Boys	Girls	Boys	Girls	Per cent.	Per cent.
Aged 9	·07	·16	·32	−·03	1·6″	1·95″	70·6	+20·6
Aged 8	·16	·22	·31	·20	1·6″	2·0″	78·3	+28·3

The boys are a quarter as quick again as the girls. The more intelligent reply more quickly, particularly among the girls (especially the more impulsive), the more "emotional" tend also to reply more quickly, especially among the boys; and among the girls, especially the older girls, this is further counter-balanced by a tendency for the more "emotional" (especially the more bashful) to hesitate in their replies. When words relating to specific emotions are distinguished and the times are calculated separately, the emotional influence and the sex-differences are far more prominent.

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[1] J. Jastrow, "Communtity of Ideas of Men and Women," *Psychological Review*, Vol. III (1896).

[2] We relied chiefly upon the lists used by Jung and by Kent and Rosanoff. For very young children and uneducated adults we have found a $\frac{1}{5}$-second stop-watch sufficiently accurate. For educated adults and older children this is too coarse; we have found the d'Arsonval chronometer most suitable.

The sex-differences in the nature of the replies are most striking in the older children and in the students. Among the very young children they are, in comparison, small. Thus, to "Dear" the commonest reply with children of eight to ten years of age is "love" in both sexes; it is said by 12 per cent. of the boys and 13 per cent. of the girls; with children of thirteen to fourteen years of age the commonest words are, among the boys, "cheap" (21 per cent. boys, 11·6 per cent. girls), and among the girls, "mother" (14 per cent. boys and 16 per cent. girls). With the students the commonest words are, among the men, "food" (33 per cent. men, 0 per cent. women); among the women, "me!" (6·6 per cent. men, 23 per cent. women).

The following table illustrates the more striking sex-differences in the common responses. The figures against the replies indicate the frequency reduced to percentage with which the reply was given by individuals from the group in question.

TABLE IX. **Associative Reactions. Replies.**

(130 children; 60 adults.)

Stimulus Word	Wallasey School Children			Liverpool University Students		
	Reply	Boys	Girls	Reply	Men	Women
		Per cent.	Per cent.		Per cent.	Per cent.
Friend	"Enemy"	30	10	"Foe"	33	23
	"Girl"	0	15			
Kiss	"Girl"	22	6·4	"Girl"	33	9
	"Love"	8	12	"Lips"	0	23
Lie	"Truth"	21	8	"Truth"	33	14
	"Down"	16	27	"Down"	0	20
Fear	"Brave"	14	16·6	"Not"	33	14
	"Fright"	1·6	6·4	"Fright"	5	14

The significance of the responses is further illuminated by the results of *Questionnaires* dealing with the chief emotions and emotional interests. The following table illustrates in a simple form the result of questions as to the things most feared.

TABLE X. **Children's Fears.**

(250 Waterloo children.)

	Age 5-7 years		Age 8-10 years	
	Boys	Girls	Boys	Girls
	Per cent.	Per cent.	Per cent.	Per cent.
Animals	39	50	82	61
Persons	26	20	9	26
Inanimate Objects	22	8	9	5

The various replies are reduced to three main classes. The figures indicate the number of children in each group who mention objects falling under one or other of these classes. "Animals" include such replies as "lions" (mentioned by 44 per cent. of the boys, aged 8 to 10; but by only 8 per cent. of the girls), "cows" (mentioned by 26 per cent. of the girls, but by only 13 per cent. of the boys), "rats," "cats," "elephants," "spiders." "Persons" include such replies as "robbers" (18 per cent. girls, 2 per cent. boys), "bad," "black," or "drunken" men, "ghosts," "bogies," "relatives," &c. "Inanimate objects" include such replies as "engines," "trains," "motor cars," "cannons" (feared especially by boys); "trees," "the dark," "being run over," "moon" and "stars" (feared especially by girls), "thunder," "lightning," &c.[1]

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[1] For the foregoing results we are indebted to an unpublished research of Miss Moore, carried out upon children of Rawson Road Council School, Waterloo (near Liverpool, Lancs.) and Dinnington School (near Sheffield, Yorks.).

From the foregoing it seems clear that the nature of the emotions predominant in either sex and the kind of objects arousing emotions differ even at a very early age; that these differences are small, but increase with increase of age. How far this is due to the further ripening and fixing of innate instinctive and emotional tendencies and how far due to tradition and environment can at present scarcely be estimated. There seems, however, little doubt that each factor exerts an appreciable influence.

The differences in emotional capacities are larger than the differences in reasoning capacities. But they are not as large as the sex-differences in certain physical qualities and in certain processes of sensation and movement. In size they fall somewhere between differences in compound sensori-motor processes and acquired associations of movements or ideas. This is in harmony with the general trend of our results. So far as they are innate, emotional differences must be referred to differences in the primary emotions, that is, in the subjective manifestations of the instinctive dispositions common to the human race—fear, anger, sex, and so forth. By an instinctive disposition we may understand an innate system of associations whereby certain perceptions tend to excite certain complex and innately co-ordinated movements of the body, and certain changes in the viscera and glands. Such processes we should naturally place midway between sensori-motor processes of a relatively low degree of complexity and acquired systems of associations between movements and ideas, such as those learnt by memory or habitation. With this level the magnitude of the sex-differences discovered corresponds.

V.—Conclusions.

We have now examined the various levels and the various aspects of mental life. We have considered every conscious process of importance which can be measured by experimental means; and at every point we have endeavoured to formulate the degree of sex-difference in an exact and comparable form. Our main conclusion may be recapitulated as follows. With few exceptions, innate sex-differences of mental constitution are astonishingly small—far smaller than common belief and common practice would lead us to expect. Neither on the simplest level, nor the more complex levels, nor on the highest levels of all, neither on the intellectual side, nor on the practical side, nor on the emotional side, have we found sex-differences so large as those found in few physical characteristics. So far as the innate differences exhibit any general tendency in their relative size, they tend to diminish rather than to increase as we pass upwards from simple processes of sensation and movement to complex processes of reasoning. They appear, too, to be throughout quantitative rather than qualitative,—differences in the degree to which capacities common to both sexes are developed in the one sex or in the other, not differences due to the presence of capacities of a certain kind in one sex and their absence in the other.

To this conclusion, however, there seem many minor exceptions. These are often more harmonious with the results of every-day observation than with the general trend of our conclusions. It is interesting, therefore, to enquire whether any of these special differences, which are found cutting across the broader tendency formulated above, can themselves be ascribed to the operation of any general principle.

We have noticed, in the region of sensation, that, while women have lower and more delicate absolute thresholds than men, men have lower and more delicate relative thresholds. Women appear more sensitive; men more discriminative. Women surpass men especially in those sensations which have a high affective value—smell, colour, tone, touch; men surpass women especially in those sensations which have a high intellectual and practical value,—movement, weight, brightness, areas felt, lengths and areas seen. It will be convenient to epitomize this distinction in terms of a single phrase. Borrowing two terms familiar to psychologists in a more limited reference, we might describe the sensibility of women as protopathic, that of men as epicritic.[1] Again, women surpass men in power to learn new movements and new associations; but men surpass women in the quickness, accuracy and regularity with which they reproduce movements already learnt or ideas already associated. Finally, women excel wherever emotions are seen to interfere with higher mental processes and to express themselves immediately and overtly in motor and organic changes; on the other hand, wherever there are differences in power of reasoning and of attention these, when well-accredited, seem to be slightly in favour of men. Now there is some grounds for believing that a certain portion of grey matter at the base of the brain, known as the thalamus (the head ganglion of the brain stem), is in man concerned, at any rate in part, with the elaboration of sensations of a more primitive kind and of highly affective character, and with the natural expressions of the emotions; and that another portion of the grey matter on the surface of the brain, known as the cortex (the outer envelope of the cerebral hemispheres) is concerned with the more recently evolved sense-perceptions and with discriminative sensibility.[2] Further, the thalamus appears to be the centre for the natural expression of the emotions; and the cortex for the control of movements, and for acquisitions of acquired movements and associations of ideas, and for the reproduction and execution of those movements and associations when acquired. It is thus tempting to summarize these more special differences by saying that, in the adult man, the cortex tends to appear more completely organized; and, in the adult woman, the thalamus tends to appear more completely organized. Briefly and crudely, that the mental life of man is predominantly cortical; that of woman predominantly thalamic.[3]

The foregoing formulations of general and specific nature of the mental differences between the sexes we may provisionally accept. We have now to ask how far the difference, as thus stated, is congenital or acquired; and if congenital, how far it is primary, and how far secondary to differences more fundamental.

The more important of our tests have recently been carried out, not only upon children of the age and social class groups above described, but also upon over a thousand children of other ages (chiefly 6 to 14) and upon adults, upon children and adults both of different social status (chiefly from Liverpool slums or from Liverpool University), and of different nationality (chiefly Irish and Hebrew). The results may be shortly summarized as follows. Every test appears to differ with differences in race, status, and age; some of the differences, however, are extremely small; on the other hand, many of the sex-differences persist in spite of variations in the nature of the environment according to race or creed or class, and in spite of variations in the time during which the environment has operated upon the individual, i.e., variations of age. These constant sex-differences include most of the differences emphasized as of theoretical importance in the foregoing discussion. These, therefore, we may assume, in the main, to be innately determined.

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[1] These terms were introduced by Dr. Head and Dr. Rivers to explain certain differences in skin sensibility elicited by experimental tests at different stages in the recovery from a vivisection experiment upon one of themselves. A brief description is given in Dr. Myers' *Introduction to Psychology*, pp. 4-12. It will be found that some violence to the original intention of the terms introduced in extending them to cover sex-differences in sensibility noted above; in particular, it should be remarked that in one of the tests of epicritic sensibility upon the skin of the hand and arm—that of two point discrimination—women happen to be superior.

[2] G. Holmes and H. Head, "Sensory Disturbances from Cerebral Lesions," *Brain*. Vol. XXXIV (1911), p. 102 seq.

[3] Space forbids us to defend or qualify this rough description. It appears to us to formulate somewhat more scientifically the elements of fact contained in the common formulation of the supposed antithesis between man and woman as intellectual and passionate, rational and emotional, to bring these facts into relation with recent experimental and psychological results, and to avoid the serious misunderstandings and erroneous inferences to which the loose use of these popular psychological terms has given rise. On the other hand, it must be recognized that the analogy indicated cannot be pressed, and is by no means final.

It is tempting to picture, as the basis of these differences, some peculiarity in the material structure of the central nervous system; some difference in neurone (or nerve-cell), in synapse (or nerve-junction), or in the general scheme of neural organization,—some difference, that is, in the bricks, in the mortar, or in the general architecture of which that half-built edifice—the brain, spinal cord, and nerves—is at birth composed. We find it easy to believe that such differences in bodily structure may be inherited; we find it difficult to conceive how differences in psychic processes, conceived purely as such, may be inherited. For we know nothing as to the application of the laws of heredity to the soul. Are we justified in this physical explanation? And are the physical differences postulated general differences in the nervous system as a whole? Or are they rather specific differences in special parts, or even the specific results of prior physical differences outside the nervous system altogether? We have seen that in at least one case sex-limitation in the inheritance of mental characters conforms in Mendelian principles. And these principles which apply pre-eminently to bodily structures and to vehicles of inheritance which are themselves conceived as structural and material. Could we apply these principles throughout, we might construct a satisfactory answer to the problem why the sex-characters of the father are transmitted only to the sons and the sex-characters of the mother are transmitted only to the daughters, instead of blending, as many non-sexual characters appear superficially to do. The most striking instances in which a complex of characteristics appears to follow Mendelian principles in man are those furnished by the temperaments of the North European (or Teutonic) race and South European (or Mediterranean) race. Now it is suggestive that many of the features in which these two races appear to differ innately from one another resemble those in which the sexes differ. Indeed, a fanciful analogy might easily be drawn both as regards physique and as regards temperament between the typical man and the typical Teuton, and between the typical woman and the typical Mediterranean or "Celt," as these typical personalities are popularly conceived. An element of truth may underlie this analogy. Could we therefore assume that the features in question were related to unit-characters[1] inherited upon Mendelian lines, we should be able to explain how mental characters come to be limited in inheritance to either sex. That these particular features are the ones which in man have come to manifest sex-variations, and that other features, which from their biological or physiological nature might equally have been expected to vary with sex have, nevertheless not done so,—this may still be explained upon lines indicated by Darwin, namely, Natural and Sexual selection. With these specific biological explanations, rather than with the general physiological explanations favoured by Spencer and by Thompson, the miscellaneous character of sexual differences and their irregular distribution conforms.

That the physiological functions and development peculiar to woman should also influence her temperament can scarcely be doubted. In the case of certain instincts and emotions, such as the maternal, the personal, and the self-submissive instincts and emotions, her physiological duties seem by natural selection to have determined her special characteristics through direct inheritance of those which are most useful. In most cases, however, the mental characteristics seem determined in a fashion which is secondary and superinduced rather than direct and innate, though, perhaps, almost as inevitable. For instance, we know that variation in the reproductive organs is correlated with variation in the development of other glands, such, for instance, as the pituitary gland, the adrenal gland, and the thyroid gland in the neck; and peculiarities in these glands are closely related to peculiarities of temperament. Hence, the 'primary' characters of sex may involve secondary peculiarities of temperament merely through their influence on the secretions poured into the blood. Contrasted with one another, the life of woman is largely visceral; that of man, largely muscular. It is natural, therefore, to find in woman the temperament characteristic of those whose viscera are large and active, and whose muscles are relatively underdeveloped and little used. Now the sensory excitations arising in the viscera are eminently protopathic; their special receiving centre appears to be the thalamus. Further, an active thalamus would tend to inhibit and to divert, depress or drain away the activities of the cortex; and an inactive thalamus would leave the cortex free to develop to a more completely organized activity. We have, therefore, no need to assume a general structural difference, thoroughgoing and innate in the nervous system of man and woman. It is rather to the indirect and incidental consequences of other anatomical and physiological peculiarities that the slight mental differences between the sexes, which we have discovered, appear for the most part to be due.[1]

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[1] The mental characteristics of either sex cannot themselves be unit-characters. The differences are throughout differences of degree, not of presence and absence. Even so specifically feminine a character as the maternal instinct is undoubtedly possessed by the male, though in a less intense form. cf. McDougall, *Social Psychology*, p. 69.

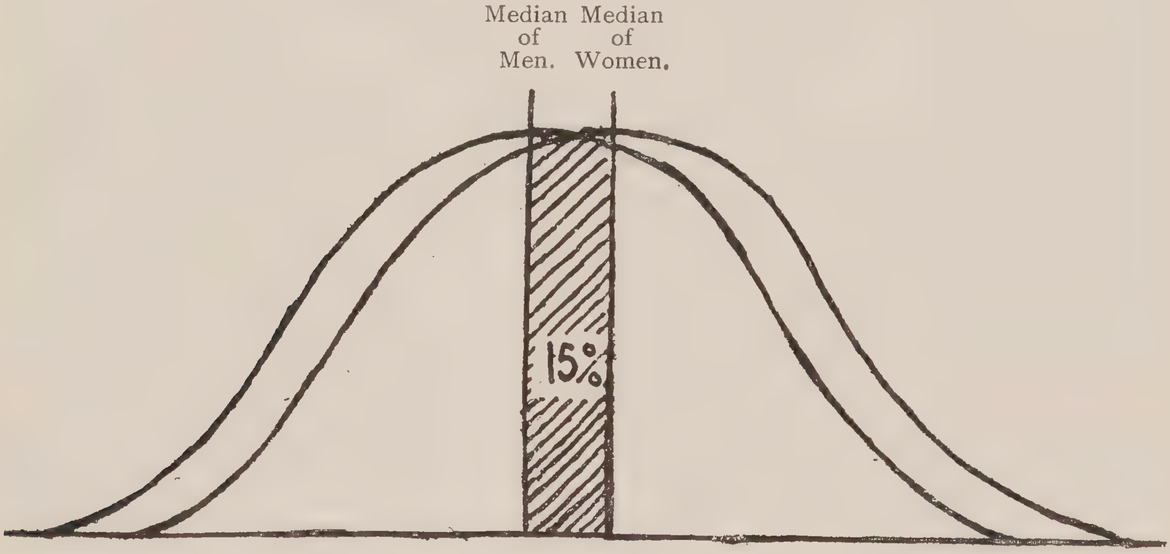

Fig. 3.

To illustrate the degree of sex-differences (± 10 − 20 per cent.) in higher mental processes (Alphabet, Symbolical Problems, Opposites, Argument Tests with Wallasey group). The displacement of the two curves is to be contrasted with that shown in physical characteristics, illustrated in Fig. 1 (difference in stature; + 47 per cent).

In conclusion, we may venture briefly to indicate the educational and social implications of our results. As regards the mental characteristics which concern the teacher or social worker most, namely, the higher or more composite mental processes, our results harmonize with the view expressed by Professor Thorndike:[2] "sex is the cause of only a small fraction of the differences between individuals; the differences of man from man and of woman from woman are as great as the differences between man and woman." This is seen most clearly by the frequency curve illustrating diagrammatically the degree of sex-difference as compared with individual variations in some of the highest tests showing any significant sex-differences (Fig. 3). As regards the simplest processes of sense-perception and movement, our results do not harmonize with Professor Thorndike's view. In these, the sex-differences may be almost as large as that represented by the frequency curve for stature (Fig. 2, Vol. I, No. 4, p. 283).[1] The measurements of the two sexes scarcely overlap at all. These processes, however, are precisely those which concern the educator and social worker least; and even these are largely amenable to the influence of exercise and training. We cannot therefore agree with those writers who regard the mental differences between the sexes as constitutionally inevitable, and hence incapable of being eradicated or modified by social influences, such as selective breeding or traditional ideals. Nor can we agree with those writers who urge that the teacher who wishes to "educate individuals rather than treat his pupils as homogeneous masses" will find the "first and safest classification that which is based upon sex";[2] or that "the psychological differences between man and woman are so intimate, so deep, and so all-pervading . . . that, if mixed schools are to be justified it must be on grounds other than psychological, and those grounds must be overwhelmingly strong to justify the ignoring of the by no means weak psychological objections."[3] Interested primarily in intellectual activities, the teacher, we believe, will here find large sex-differences in but a few isolated functions, such as memory and mathematical ability; interested secondarily in the individual personalities of his pupils, he will find many differences in emotional and moral characteristics, to which difference of sex may prove an obvious clue and a ready explanation; a clue so obvious and an explanation so ready that he must not forget that other causes are at work producing individual variations which may entirely swamp the tendencies originated by differences of sex. We incline therefore rather to that group of writers who, whether emphasizing the mental differences between the sexes[4] or minimizing them[5] in their several theoretical generalizations, agree that in the practical issue "the question of the future development of the intellectual life of woman is one of social necessities and ideals, rather than of the inborn psychological characteristics of sex."

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[1] One of the writers wishes to express his indebtedness to a suggestive conversation with Professor Sherrington, who was good enough to discuss an earlier and more summary formulation of the writer's views.

[2] *Educational Psychology*, *loc. cit.*, 2nd ed., p. 50.

[1] We have no space here to discuss the relative variability of the two sexes in mental traits. In the Wallasey group, the coefficients of variation range from 4 to 56 among the boys, and from 8 to 52 among the girls. There is thus a greater range of individual variation in mental traits than in physical (cf. first portion of this article, p. 279). The difference between the median coefficients (21·0—17·5=3·5) indicates that the girls are slightly more variable. The difference, however, is scarcely twice its probable error (±1·9). Among the students and among the younger children, the males appear somewhat more variable, so far as our data go. Thus, our results agree with Thorndike's:—"Except in the two years nearest the age of puberty for girls, the male sex is slightly more variable" (*loc. sit.*, p. 40).

[2] Schuyten, *L'Education de la Femme*, *loc. cit.*, p. 175.

[3] Welton, *The Psychology of Education*, pp. 135, 137.

[4] e.g., Arthur Wreschner, *Vergleichende Psychologie der Geschlechter. Wissen and Leben*, IV Jahrg., xii Heft, p. 823; (the best and most impartial summary of recent psychological work on the comparative psychology of the sexes that has yet appeared).

e.g., Helen Thompson, *Mental Traits of Sex*, p. 176 seq.

LATIN REFORMED METHODS.

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THE second Summer School of the Latin Reform Association was held at Bangor, from September 4th to 13th, under the presidency of Dr. Rouse. The morning was divided into four periods; at 9.15 and 11.15, two concurrent series of lessons were given, one to boys and another to girls, at various stages of progress in Latin; at 10.15, the members of the school engaged in various forms of conversational exercises; at 12.15, lectures were delivered by prominent exponents of the direct method; and in the evenings there were various entertainments in the form of Latin recitations, songs, or short plays.

My purpose in this article is to confine myself to the particular series of lessons given to beginners, and I shall try to give as exact an impression as is possible on paper of what was done and how it was done.

The class consisted of twelve boys of about twelve years of age brought by Mr. C. L. Mainwaring, their form master, from Whitgift School, Croydon. The method has been used in the school for some years; the boys were bonā fidē beginners, taught by their regular master; in fact, it was merely an anticipation in the last fortnight of the holidays of the work which they would, under ordinary circumstances, receive in the following term. More ground was, however, covered in the time than would be attempted in the school. The boys, besides knowing English grammar, were familiar with the direct method through their French, and had received a course in phonetics.

I will begin by giving a skeleton of the topics treated in the eight periods* in the order in which they were taken: (1) the variations of number and person in the present indicative active of all four conjugations, occupying two periods, and the nominative of the personal pronouns; (2) nouns and adjectives of the first declension nom. sing., introduced in answer to the questions, "Quid est?" "Quālis est?" "Quanta est?" occupying one period; (3) the accusative as object, a lesson and a half; (4) the nom. and acc. plural of first declension, acc. with prepositions, and drill in all the rules hitherto taken, two periods and a half; and (5) the nom. and acc. sing. and plur. of the second declension masculine, one period. The agreement of the adjective in number and case had thus been practised, and its agreement in gender had just been introduced, but no explicit statement of the rule had been made.

Next I will try to give a more detailed account of the procedure.

Persons of verbs. Boys were taught on the command "Surge" to stand up and say "Surgō"; similarly with "Cōnsīde" and "Cōnsīdō."

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* The course, of which these lessons are the beginning, is contained in *Primus Annus*, W. C. Paine and C. L. Mainwaring, Oxford, at the Clarendon Press, 1912.

Next the master said "Quid facis?" and obtained the answer. Then they were taught when the master stood up saying "Quid faciō?" to say "Surgis"; similarly "Cōnsīdis." These four formulæ were then taken with various boys in every variety of order till they had become automatic. Next, as a boy rose, the master, looking at a second boy and pointing to the boy rising, said "Surgit. Quid facit?" The difficulty in a written account is to explain the precise intonations and gestures by which the boy knows that he is expected to say "Surgit"; this is precisely where the skill comes in. Of course, the first time "Surgit" has not the clear-cut meaning that "Smith Minor is in the act of getting up" would have; if it had, it is almost certain that the Latin word would be associated in the boy's mind with an English translation. But he is made to point at the boy who is doing the act, looking all the time at the master, and, after similar action with "consīdit," "venit," "scrībit," &c., implicit analogy comes in and the mysterious formula acquires meaning. The plurals were treated similarly. Then "stō" and "sedeō" were introduced, the difference in meaning from "surgō" and "cōnsīdō" being explained in English. Finally, the command "abīte" was given in a purposely casual manner; the boys, of course, were puzzled; and it was then repeated with suitable gestures, and the boys disappeared laughing.

The second period of course began with drill in the formulæ previously learned. "Veniō" was added to complete the four conjugations. Eventually the present indicatives were written on the blackboard in answer to the usual questions, and the master called attention in English to the fact that the final syllable of the imperative gave the cue to the type which any new word would follow. More drill followed, and included the new formula, "Quis surgit? Scōticus surgit." (The boys all had Latinized names.) The conjugations were copied down and learned as homework. (Boys had been called out to write words on the blackboard at intervals throughout.)

Nominatives of first declension. After drill in the verbs, which showed that they were well known, the master introduced such formulæ as "Haec est sella," "mēnsa," "fenestra," "iānua," "tabula," "pila," followed by "Quid est?" This was followed by statements such as "Tabula est quadrāta," "Quālis est tabula?" Adjectives like "rotunda," "magna," "parva," "nigra," "alba," "rubra," were introduced, and "Quanta?" was added to the formulæ of questions. Questions involving "Quid?" "Quālis?" "Quanta?" were introduced in irregular order. Revision of this work and of the verbs was taken at the beginning of the next period.

Accusative of the object (period and a half). Master: "Crētam teneō: quid teneō?" Boy: "Crētam teneō." Gestures and intonations; boy alters to "Crētam tenēs." Master: "Quid est?" Boy: "Crēta est." Master: "Quid teneō?" Boy 2: "Crētam tenēs." Repeated with other boys. Master: "Pila est," &c., as with "crēta." Then with other words. Then with "Mēnsam tangō," "crētam sūmō," "crētam pōnō,"" iānuam pandō," "iānuam claudō." Next with third persons, "Quid sūmit?" "Quis crētam pōnit?" Finally with adjectives, "Quālem tabulam vidētis?" "Quadrātam tabulam vidēmus."

A long drill in these same forms was taken in the next period. It was a long time before a false concord occurred. Then, "Quid est hōc?" "Crēta est." "Quālis est crēta?" "Alba est crēta." "Quid teneō?" "Crētam tenēs." Quālem crētam teneō?" "Alba (sic) crētam tenēs." Master: "Alba!" (surprised). "Quālem?" (emphatic last syllable). "Albam" (decisive last syllable). Drill all round. Eventually by means of "Dextra sinistram tangit," "Dextram sinistra tangit," the idea was brought into the focus of consciousness. "Quid sinistram tangit?" "Quid dextra tangit?" forced right answers. Then the two phrases were written on the board: an explanation was afforded by means of questions on English analysis, and the words "Nōminātīvus," "Verbum," "Accūsātīvus" were written. The unexpressed subject was explained by "Pilam tenēs: quis tenet?" "Ego pilam teneō."

Nominative plural. The rest of this period was occupied with the numerals. "Ūna pila est: Duae pilae sunt," &c., and by drill on old work by means of a map. "Quid est hōc?" "Insula est." "Quālis, quanta, quot?"

Accusative plural. The methods being the same as for the singular, details are unnecessary. Seven minutes were taken with ringing the changes on nom. and acc. sing. and nom. plur., with and without adjectives: then the acc. plur. was introduced, this part of the lesson ending with sentences of the types, "Quālēs pilās teneō?" "Quot pilās teneō?"

The prepositions "prope" and "inter" were next introduced. The types of answers "prope fenestram stō," "crēta est inter pāginam et pilam," and (with map) "Gallia est inter Germāniam et Hispāniam." Of course, "ubi" was added to the question formulæ.

The seventh period represented rather an addition to the length of answers than the introduction of new forms. The prepositions "circum," "extrā," "intrā," and "ad" were added. At the end the following were written up and copied by the boys in their note books. "Scōticus surgit. Ad iānuam prōcēdit. Prope iānuam stat. Iānuam pandit. Nunc extrā cameram stat. In cameram prōcēdit. Iānuam claudit. Ad sellam prōcēdit. Cōnsīdit. Silet. Dormit." Of course, the action was gone through while this was being written on the board. It was afterwards repeated in the first person.

Second declension. The last of the eight periods introduced the nom. and acc. sing. and plur. of the second declension (words in -us and in -er of the magister type). Adjectives were not introduced for the first half-hour. Of course, we heard "ūna (sic) liber est," which was straightway altered by the master without explanation. Some drill was given, but the stage of calling explicit attention to gender had not been reached in this lesson. Only one confusion of declension (duo digitae) occurred. The approaching ascent of Snowdon had no effect in distracting concentration.

I have noted fairly accurately the amount of vocabulary used in the lessons: 26 verbs (which were introduced earlier than most of the nouns), 26 nouns (17 of the first and 9 of the second declension), 8 ordinary adjectives, 12 numerals, 12 pronouns and adjectives introducing questions, 6 prepositions, 7 conjunctions, &c., total 97.

Boys were asked to write new words on the blackboard at an early stage. At first English analogies sometimes led to wrong spellings, e.g., "cella" for "sella"; these were simply corrected by the master pronouncing the mis-spelling phonetically, which led to the boy at once detecting and correcting his mistake. Phrases such as "Mōnstrā, intellegisne?" were introduced and made familiar before the grammar in which they were based was taken, as were "Nōn intelligō" and "Librum nōn habeō.

There was far less correction in English than those who are not familiar with direct methods might expect. Repetition in a surprised tone, with the right word following and the important syllable emphasized, were usually quite sufficient. It was interesting to note how the phrases, which at first hearing were magic formulæ, acquired meaning very rapidly. Analogy seemed to act very powerfully, and almost unconsciously: except venĭmus for venīmus, I did not notice any difficulty as to the right conjugation to which a verb shall belong.

I have not attempted to discuss the principles underlying the method—they are well known to teachers of modern languages—but simply to show how they are being applied to the special difficulties of an inflected language by the pioneers in the work. The reader can easily see how much thought must have been spent in the task. The tactics consist not in a postponement or avoidance of the special difficulties, but in a frontal attack on them without any preliminary skirmishes. I much suspect that most doubters or opponents are largely influenced by a semi-conscious supposition that accidence and syntax are ignored by the direct method. Of course, they cannot be ignored; the direct method is the method of teaching these very things directly.

SOME OBSERVATIONS ON THE USE OF THE "RECKONING TEST" IN SCHOOL CHILDREN.

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Professor Kraepelin's Reckoning Test is a test which affords an index to the working intellectual capacity. On account of its simplicity, it is applicable to all grades of minds—normal and otherwise,—and for this reason also is specially useful in testing the intellectual capacity of children.

The Reckoning Test as used in this experiment was Professor Maloney's modification of Professor Kraepelin's Test. Maloney, by altering the spacing of the columns, the width of the margins, &c., produced a modification whereby the test was much more easily performed, and the various mechanical factors in it were greatly minimized.

Maloney's modification of Kraepelin's Reckoning Test consists of ten columns of figures arranged vertically from the top to the bottom of the page, and each column contains 21 units. Briefly, the test is conducted as follows:—The person who is being tested is required to add the digits in pairs as rapidly as possible. To economize space, the method of continuous addition is employed; thus, if, e.g., the first five figures on the page ran as follows, 8, 3, 5, 7, 9, the digits would be 8 and 3, 3 and 5, 5 and 7, 7 and 9. After a few seconds warning the test begins, and the time is noted. At the end of each minute the examiner calls "Stroke," and thus the number of units counted in any particular minute is known.

I selected for examination 18 children—9 boys and 9 girls—and divided them into three groups, those of bright intellect, those of average intellect, and those of dull intellect; each group consisted of 3 boys and 3 girls. The children were carefully chosen by the Head Master of St. Michael's School, Dumfries, and were all about eleven years of age —some a few weeks over, some a few weeks under eleven. The children were tested for fifteen minutes on five consecutive days, and under the same uniform conditions of quietness and surroundings. Even to children of eleven years of age there was no difficulty in performing the test. At that age they could all count, and further, as the maximum of any two units never exceeded 18, even the addition was of the simplest kind.

I shall now very briefly detail the results and observations which this test afforded.

In placing the children in the three groups—bright, average, and dull, it must, of course, be remembered that, although a boy or girl may be said to be generally of bright, average, or dull intellect, as regards ability to count, or natural "gift for figures," this statement may be reversed, and hence the results in so few cases must at present be viewed with caution. I was greatly impressed with the different way in which the children began the test; all of them were keen, they all showed a spirit of rivalry, but for the first day, at least, the attention of the girls was much more "sensitive," and throughout that day they exhibited a distinct restlessness, which in the boys was quite inconspicuous.

Rate of Working.—As regards Rate, the bright boys were very much better than the bright girls, the average boys not so good as the average girls, and the dull boys slightly better than the dull girls. These facts are, I think, in accordance with every-day experience; a bright boy is "smarter" than a bright girl, but an average boy is not so alert as an average girl, whilst there is little difference between a dull boy and a dull girl.

The total rate of all the boys was 19,717, in the girls it was 18,304, hence the boys worked more quickly than the girls, exceeding the total of the latter by 1,413. That the rate is capable of improving quite independent of the intellectual capacity is apparent, for all the children showed, without exception, a marked increase of the rate on the 5th day as compared with the 1st.

The test, therefore, is probably of value in the education of children by teaching them smartness and alertness in the addition of figures.

Improvability.—This was estimated by calculating the percentage difference on the work done between any two definite days. Between the 1st and 2nd day of the test this averaged in the bright boys 49·1 per cent., in the average boys 28·2 per cent., in the dull boys 25·7 per cent. The boys of bright intellect clearly showed that they had very soon—on their 1st day practically—grasped the test, and on doing the test on the 2nd day they at once showed great improvement. Between the 1st and 5th days all the boys were still improving. The bright boys still showed the largest improvement, viz., 90·9 per cent.; the average boys reached 62·9 per cent.; the dull boys 47·4 per cent. Hence, at the end of the test all the boys showed that they were capable of great improvement; but, as was to be expected, those of bright intellect "reacted" best. Between the 4th and 5th day the improvement was very slight as compared with that between the 1st and 2nd, and 1st and 5th days. In other words, the maximum working capacity had been nearly attained on or about the 4th day, leaving very little room for improvement on the 5th day. Thus, in the bright boys it averaged 2·4 per cent., in the average boys 2·3 per cent., in the dull boys 4·9 per cent. Hence, a fact is at once apparent, viz., that the dull boys, inasmuch as they showed more improvement at the end of the test than the others, are slower in working, slower in attaining or demonstrating their best.

Improvability in the GIRLS.—This differed in many ways from that of the boys. Thus, between the 1st and 2nd day in the bright girls it was not so great—32·7 per cent. (instead of 49·1, as in the boys), a decrease of 16·4 per cent. Hence, bright girls are possibly not so good as bright boys. The improvement in the average girls between the 1st and 2nd day (32·3 per cent.) was practically the same as in the bright girls (32·7 per cent.), and exceeded that of the average boys by 4·1 per cent. The average girl, therefore, is slightly quicker than the average boy. In the dull girls the improvement between the 1st and 2nd day was large; it reached 44·6 per cent., and exceeded that of the dull boys by 18·9 per cent., a further fact suggesting that dull girls are capable of more improvement than dull boys. Between the 1st and 5th days the dull girls showed the greatest improvement, viz., 91·1 per cent., which was therefore greater by 43·7 per cent. than that of the dull boys, who had shown an improvement of 47·4 per cent. In the average girls the improvement was 67·2 per cent.—less than in the dull girls, but greater than in the average boys by 4·3 per cent. (boys 62·9, girls 67·2). The bright girls, however, much earlier in the test showed their improvement, for between the 1st and 5th days it was less than in the average girls (67·2 per cent.) or in the dull girls (91·1 per cent.), and was 58·9 per cent. as compared with 90·9 per cent. in the boys, who therefore showed an increase over the girls by 32 per cent. The bright girls showed less improvement than the bright boys, and also from this test it is apparent that girls of average and dull intellect are more capable of improvement, as regards figures, at least, than those of bright intellect. From the improvability we may further infer that bright boys are really better than bright girls, average and dull girls probably better than average and dull boys.

Errors.—The total number of errors in all the boys was 126, in the girls 134; and as the boys' rate of working was larger—19,717 compared with 18,304,—the accuracy of the boys is somewhat better. The bright boys throughout the whole test had 21 errors, the bright girls 78; the average boys had 25, the average girls 10; the dull boys had 80, and the dull girls 46. Hence, bright boys, as well as being quicker "workers," are more accurate, but girls of average and dull intellect seem to be more accurate than boys of average and dull intellect.

The nature of the errors was interesting, and generally it was found that in those children who had several errors, these were of a definite and recurring nature, thus, e.g., 9 and 7 were persistently called 15, instead of 16; 3 and 8, 12 instead of 11, &c., &c. By recognizing these individual "flaws" in a child's counting powers, the test is of infinite value, for by correction and practice these mistakes can be rectified, and apparently false associations can be broken down.

In conclusion, I have no hesitation in saying that the Reckoning Test is one which is of great value in the education of children. It improves their powers of counting and makes them alert; it improves their accuracy, no matter what their normal intellectual capacity is, and we get as a result increased alertness along with increased accuracy. Further, it is of immense value for detecting the various arithmetical flaws, acquired or otherwise, which exist in a child's mental mechanism, and by correcting and breaking down these false associations, the education of the child is in this special department greatly helped.

Lastly, I would like to say that this short experiment was done at the suggestion of Sir James Crichton Browne, who referred to my results and observations in his Presidential Address to the Child Study Association.

My best thanks are due to Mr. Hendrie, St. Michael's School, Dumfries, for his willing co-operation.

TABLE SHOWING
(A) Percentage Improvement between 1st and 2nd day, and (B) The Average.
(C) Percentage Improvement between 1st and 5th day, and (D) The Average.
(E) Percentage Improvement between 4th and 5th day, and (F) The Average.
in the following children:—

	DULL BOYS (3).						AVERAGE BOYS (3).						BRIGHT BOYS (3).					
	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
1	45·5	25·7	90·0	47·4	11·6	4·9	23·3	28·2	73·2	62·9	2·7	2·3	43·3	49·1	70·6	90·9	−2·2	2·4
2	17·5		24·8		1·5		17·8		47·2		0·4		71·4		134·5		6·0	
3	14·3		27·5		1·7		43·7		68·4		4·0		32·7		67·7		3·6	
	DULL GIRLS (3).						AVERAGE GIRLS (3).						BRIGHT GIRLS (3).					
1	39·6	44·6	78·1	91·1	10·0	3·4	45·4	32·3	94·8	67·2	8·7	2·5	29·7	32·7	70·9	58·9	11·1	1·5
2	78·2		115·2		0·		22·5		38·4		1·2		21·5		40·3		−4·0	
3	16·2		80·2		0·2		29·2		68·5		−2·3		46·9		65·5		−2·5	

TABLE SHOWING TOTAL RATE OF WORKING, NUMBER OF ERRORS, AND PERCENTAGE OF ERRORS THROUGHOUT THE FIVE DAYS TEST.

	Total Rate.	Average Rate.	Total Errors.	% Total of Errors.	% Average of Errors.
3 Dull Boys	5,270	1,756	80	1·7	0·56
3 Average Boys ...	6,301	2,100	25	0·39	0·13
3 Bright Boys	8,146	2,715	21	0·25	0·083
Total ...	19,717	6,571	126		
3 Dull Girls	5,198	1,732	46	0·88	0·29
3 Average Girls ...	6,783	2,261	10	0·13	0·043
3 Bright Girls	6,323	2,107	78	1·23	0·41
Total ...	18,304	6,100	134		

EXAMPLE OF WORKING TABLES.
TABLE SHOWING TOTALS PER MINUTE AND NUMBER OF UNITS RECORDED PER MINUTE, IN A BOY OF BRIGHT INTELLECT.

Name.	Days.	15 Minute Total.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Errors.
G.M. ...	1	330	25	25	20	21	19	23	21	20	25	21	21	23	23	22	21	0
	2	473	36	32	35	34	30	26	30	32	33	30	30	32	29	31	33	0
	3	552	42	41	42	34	34	37	31	33	35	36	39	39	38	36	35	2
	4	576	44	38	45	37	40	40	36	34	41	38	37	38	32	37	39	1
	5	563	45	40	37	41	39	36	40	38	34	30	33	40	36	39	35	3
	Total...	2,494	192	176	179	167	162	162	158	157	168	155	160	172	158	165	163	6

THE PROBLEM METHOD IN THE TEACHING OF HISTORY.

By FRANCES A. COLLIE, M.A., The University, Liverpool.

Part II.

Within the last few months problems of various types have been set to the same standard at Sefton Park School and also to Standard Ex. VII at Birchfield Road Council School, Liverpool. The results in all cases showed that sufficient improvement was being made by the children, both in the method of attack and also in ability to reason, to justify the adoption of exercises of this nature as an integral part of the History teaching in the Upper Standards of Elementary Schools.

After the preliminary work referred to in Part I of this paper, the children were asked to read through an extract from Napier's History of the Peninsular War (Blackie, p. 100, "Badajos, . . . (p. 101) . . . below stream") and to make a plan of the besieged city from the data given. A very good attempt was made by every member of the class, some of the boys, especially the scouts, doing elaborate and detailed work. About 40% sent in approximately correct results, and in some cases it was evident that the children had been trying to reproduce the exact distances quoted in the text.

Although the majority of the class were too much absorbed by the mechanical difficulty of plan-making to be interested in the subject matter, some intelligent questions were asked, e.g., "When San Christoval was besieged was Badajos as well, or was it used by the enemy?" "Who was the Picurina used by?" "Were the soldiers expecting to be attacked by the river? If not, why did they not raise outworks at the west of the town?"

On another occasion the children examined the following statements concerning the Crimean War, and were asked to account for the different views expressed by the Czar and Queen Victoria.

Czar's Manifesto to Russians.

Russia fights not for the things of this world, but for the faith. England and France have ranged themselves by the side of the enemies of Christianity against Russia fighting for the orthodox faith. But Russia will not alter her divine mission; and if enemies fall upon her frontier, we are ready to meet them with the firmness which our ancestors bequeathed to us. Are we not now the same Russian nation of whom deeds of valour, the memorable events of 1812, bear witness? May the Almighty assist us to prove this by deeds! And in this trust taking up arms for our persecuted brethren professing the Christian faith, we will exclaim with the whole of Russia with one heart, "O Lord, our Saviour, whom have we to fear?" "May God arise, and His enemies be dispersed." —*Feb.* 21, 1854.

Letter from Queen Victoria to King of Prussia.—*June*, 1854.

Russia has addressed to the Porte demands which she had no right to make. The forcible taking possession of two Turkish provinces with the intention of enforcing the demand was a political wrong. The preservation of the integrity of the Turkish Empire is a European interest. Notwithstanding all this, Russia continues to occupy the Danube principalities, penetrates further into Turkey, and, by forcing on a sanguinary and exhausting war, leads the unhappy and suffering empire on to the brink of the grave.

> **Letter from Queen Victoria to the King of the Belgians.**—29 *Jan.*, 1856.
> . . . England's policy throughout has been the same, singularly unselfish, and solely actuated by the desire of seeing Europe saved from the arrogant and dangerous pretensions of that barbarous power, Russia—and of having such safeguards established for the future which may ensure us against a repetition of similar untoward events.

All the children agreed that "Two nations have different opinions and interests which they try to forward, crying 'Every nation for itself'"; or, as another child, aged 12, puts it, "The difference of the letters is caused by different views being taken of the same events by people whose interests clash." Very little faith was placed in the pious protestations of the Czar. One boy, aged 13, writes:—"There is another motive behind it all; in this case probably it is the ultimate annexation of Turkey, for 'Religion is a cloak for many sins'"; and a girl of 13, "The Czar knew from experience that ambition would not inspire his subjects but the faintest chance to defend their Faith would, so he decided to appeal to the religious side of their nature. The letter from the beginning was that of a hypocrite, but the end sentence crowned it with blasphemy." A boy of 12 recognizes "the thread of diplomacy running through all three epistles," and most children mention the fact that there were other European interests involved besides those actually stated in the extracts. As is natural, all the children place more reliability in the sincerity of Queen Victoria than in that of the Czar, although some of them criticize the attitude of the former somewhat trenchantly, and question the unselfishness ascribed to the English nation. This same boy of 12 writes: "She boasted in a jingoistic strain, and would be perfectly willing to take a large bite from the pie if she could do so with impunity." A girl of 11 makes a wise generalization to the effect that "A sovereign has seldom said anything not to the credit of the nation he is ruling, and above all things never speaks about his own actions but as good," and a third makes what seems to me an important admission, viz., that it is "because she is English and prejudiced against Russia that she agrees with Queen Victoria." Some children ascribe the difference of opinion between the Czar and Queen Victoria to the fact that the latter was a woman and therefore did not take the same kind of view as a man. "She thought a war unnecessary, whereas it is more natural for a man to defend fighting."

The next problem was similar in character. The children were asked to account for the conflicting estimations of Lord Raglan's character in the two following extracts:—

> But their aristocratic general, and their equally aristocratic staff, view this scene of wreck and destruction with a gentlemanlike tranquillity. Indeed, until stung into something like activity by the reflections of the press, the person on whom the highest responsibility for this situation devolves had hardly condescended even to make himself superficially acquainted with its horrors. The aristocracy are trifling with the safety of the army in the Crimea just as here they are dawdling over that periodical luxury, the formation of a Government. . . . Lord Raglan and his staff will return to England with their horses, their plate and their china,

their German cook, and several tons weight of official returns, all in excellent order, and the announcement that, the last British soldier being dead, they had left our position in the care of our gallant Allies. —"*Times*," *Feb.* 8, 1855.

Death has suddenly taken away, while in full exercise of his command, Field-Marshal Lord Raglan, and has plunged the British in mourning. We all share the sorrow of our brave Allies. Those who knew Lord Raglan, who knew the history of his life—so noble, so pure, so replete with service rendered to his country—those who witnessed his fearless demeanour at Alma and Inkerman, who recall the calm and stoic greatness of his character throughout this rude and memorable campaign, every generous heart indeed will deplore the loss of such a man. The sentiments here expressed by the general-in-chief are those of the whole army. He has, himself, been cruelly struck by this unlooked for blow.

A. PÉLISSIER, *Commander-in-Chief.*
Headquarters before Sebastopol, 1855.

The children unanimously declared that Pélissier's account was the more reliable, because it was written by "an eye-witness of Lord Raglan on the battle-field, while *The Times* only writes what gossip it hears!" It is evident from the boys' answers that they consider the opinion of a soldier more trustworthy than that of a mere journalist, and one thoughtfully points out that the military side of Lord Raglan's character would appeal to the soldiers, whilst the general public might adopt another point of view or, as another child expresses it, "the author of a daily newspaper and a commander would not see the thing the same as each other!" One little girl, with a pathetic faith in the printed word, writes "Pélissier says the same as the History Book, which is bound to be true"; while another, aged 12, has realized two very important elements in determining public opinion, namely, the demand for a scapegoat after a national disaster, and the fact that a man's death ensures him a respite from calumny and criticism. Her answer runs as follows:—"Extract I was in our aristocratic newspaper, *The Times.* It was after the defeat of the English at Sebastopol, and of course England was feeling rather vexed with defeat, and Lord Raglan, being a commander, was of course blamed, and when the news came that Lord Raglan was coming, the people were only naturally bad-tempered. The second extract was written after Lord Raglan died, and no true gentleman will say anything bad about a dead man, but will always look at the bright, sunny side of his character."

An exercise of a rather different type was next attempted, namely, the estimation of the character of John Cobden from a letter written by him to Lord Palmerston on being invited to become President of the Board of Trade. There is a marked difference of opinion between the answers of the boys and girls. The girls almost unanimously praise the "frank, manly, and straightforward tone of the letter," and argue that the writer must have been an honourable, independent man, not afraid of speaking his mind, true to his side, and not likely to change his opinions for personal profit, nor too proud to acknowledge himself in the wrong." One girl rather cynically adds, "he differs from other politicians in that he is honest in his work." Many of the boys, on the other hand, were much more critical. "He seemed to have a good opinion of himself";

"too quick at jumping at wrong conclusions"; "impatient"; "himself warlike, intermeddling, and quarrelsome"; "he had a way of winning a person by praising him."

Some good work was done on a passage from Diodonis Siculus :—

> Opposite that part of Gaul which borders on the ocean . . . there lie many islands. This of old was never assailed by foreign force, for it was never known that either Bacchus or Hercules, or any of the ancient heroes or princes, ever made any attempt upon it by force of arms, but Caius Cæsar in our times subjugated the island and compelled the Britons to pay tribute . . . In form it is triangular, like Sicily, but the sides are unequal. It lies in an oblique line over against the continent of Europe, so that the province called Cantium, next to the continent, is about a hundred furlongs from the land; here the sea ebbs and flows, but the other point, called Belerium, is four days sail from the continent. . . . The inhabitants are the original people thereof, and live to this time after their own ancient manners and customs; for in war they use chariots, as it is said the old Grecian heroes did in the Trojan war. They dwell in mean cottages, covered for the most part with reeds or sticks. In reaping their corn they cut off the ears from the stalks, and so house them up in repositories under ground; thence they take and pluck out the grain of as many of the oldest of them as may serve for the day, and after they have bruised the corn make it into bread. They are of much sincerity and integrity, far from the craft and knavery of man amongst us; contented with plain and homely fare, strangers to the excess and luxury of rich man. The island is thickly inhabited, and the temperature of the air exceedingly cold.

The children were asked what information they could gather from this passage about the author.

Their combined results may be summarized as follows :—

The writer was evidently not a Briton :

(1) Because he seemed surprised at their uncivilized ways and strange manners and customs.

(2) He evidently lived in a warmer climate because he found "the temperature of the air exceedingly cold."

(3) The whole tone of the extract implies that he was not a native of Britain.

He probably came from either Rome, Greece, or Sicily :

(1) These were all civilized countries at that time, and the writer seems a learned man.

(2) These are all warmer countries than Britain, and further the writer was evidently used to the almost tideless Mediterranean. (He draws attention to the fact that "here the sea ebbs and flows.")

(3) The writer lived at the time of the Roman Conquest of Britain.

The majority of the children very naturally concluded that the writer was a Roman, probably a member of Cæsar's invading army, as he knew so much about the country and mentioned Cæsar by name.

Only in that standard where the children had been working at the problems for some time did they give any reasons, other than those quoted above, for thinking that the passage was written by a Greek.

Three boys stated that the fact that the Grecian heroes are mentioned makes it probable that the author belonged to Greece, one boy adding "the Romans would not talk about the Greek heroes conquering what they conquered."

Finally, in order to see how the children would set to work at an extract about the contents of which their knowledge was very limited, they were given a passage from *Joinville's* "Chronicles of the Crusades." A large percentage of children quickly discovered the key-words, and said that if they knew what language "livre" was, and in what country "Nemours" was situated, they could answer the questions. Some thought the words sounded French, some Spanish, but their mode of attack showed that they knew what to look for, and that is, surely, one of the primary requisites of intelligent reading. I have quoted largely from the children's papers because I feel convinced that they are the best arguments for the Problem-method.

In addition to the advantages already claimed for the use of original documents I would like to call attention to the extraordinary insight into the children's minds which a study of their papers reveals, and which, in my opinion, is far greater than that afforded by an ordinary test-paper. In almost every answer we find abundant proof of the child's ready facility to misconceive and distort truths which to an adult seem self-evident. This is, of course, only the natural result of the child's ignorance and lack of experience, but the young teacher is very apt to under-estimate the significance of such misconceptions. He imagines that presentation of new material is the most essential part of every lesson, and very slowly learns that with children of elementary school age only a small percentage of the subject matter penetrates into the minds of his hearers and becomes in many cases quite unrecognizable in the process.

Another merit of the Problem-method is that it sends the child to his history-books or to his teacher with questions which are the outcome of a genuine desire for knowledge, and one of the most encouraging features of the experiment was the improvement shown in the pertinence and intelligence of the questions asked by the children at the end of their papers.

There was proportionately a much greater increase in reasoning power evident in the girls' answers than in those of the boys. This was probably due to the fact that at the beginning the girls were extremely diffident and afraid to plunge. A certain amount of caution and fear of jumping too rashly to conclusions characterized their papers throughout, and whilst preventing them from making such rash errors as the boys it undoubtedly discouraged brilliant guesses on their part.

"FAIRIES."

AT the time when the conversation which is here recorded took place, little K., then three years and five months old, knew nothing about fairies. Her father and mother had deliberately kept from her all kinds of fantastic rhymes and stories in the firm belief that until there is some glimmering of the distinction between the real and the imaginary, such rhymes and stories only disturb the first developments of mind and retard its proper progress. In doing so they had no desire to confine her to a scientifically exact view of the universe. They recognized that the child's first ideas about the world around her must take mythological form, and were willing to give her all the help they could in constructing a mythology for herself. But they were conscious of the risk of introducing her prematurely to the somewhat capricious world in which live fairies and giants and the other strange beings about whom it is customary to tell young children; and they preferred to wait till they had reason to think that she was ready for the new way of thinking and imagining which this kind of knowledge involved.

The talk about fairies began quite spontaneously, when Mother and K. were busy at work. In acknowledgment of some small service done by the child, Mother remarked (as she had done occasionally before): "That is a kind little fairy." At once came the question: "What is a fairy?" Mother hesitated a moment, then decided that the time had come when she might know something about fairies. The fairies, she explained, were kind little people, who lived in the woods, and she told her about the wonderful fairy rings that could be seen there. K. was immensely interested and began to ask questions. What kind of people were they? What did they do? Where did they sit? What did they eat?

She was told that they lived in the flowers and ate the honey in them. Then she took a new line in her questioning. Had they babies? "Oh yes!" Mother said. Who took care of the babies? "Their mothers, of course." What did they eat? "They got honey, too," she was told. She nodded approval. "That is good for babies. Mother, did I get honey when I was a baby?" When told "No," she asked: "Why did I not get honey?" "Because you were a human baby, not a fairy one," answered Mother. "What is 'human'?" she asked immediately. Mother explained "that 'human' means 'belonging to man and woman,'" and the answer seemed to be found satisfactory. Then a new problem arose. "Where do the fairy babies sleep?" She was told that they slept in the bell flowers. Her eyes shone with delight at this news. "I shall go and look for the fairy babies in the flowers," she said, and she repeated the remark several times.

Then: "What do these fairies do?" Mother told her they did all sorts of kind things to people. "Tell me what kind things they would do," she said. "Suppose" said Mother, "a little girl was going through the woods and had lost her doll, they might help her to find it." "Would she see them?" she asked. "No." "Tell me another kind thing!" "Suppose," said Mother again, "a horse had put its foot in a hole, and could not get it out, they might help him." "Would the horse know?" she asked. "No," Mother answered, "the horse and the man would not know. They would think that the horse had given a very hard pull."

A moment later, she threw down a crust she had been eating. "I shall look the other way," said Mother, "and perhaps a wee kind fairy will come and eat up the brown crust." K. immediately picked up the crust and ate it. Mother then turned to an imaginary fairy in the corner of the room and said, "Thank you, kind fairy." K. ran into the corner towards which Mother had bowed, and said, "Say it again." The kind little fairy," answered Mother, "would pick up the crust and say nothing about it."

W. B.
I. B. B.

REVIEWS AND NOTICES OF BOOKS.

"The Evolution of Educational Theory." By John Adams, M.A., B.Sc., LL.D., Professor of Education in the University of London. (Pp. vii + 410.) Macmillan & Co. 10/- net.

PROFESSOR ADAMS' book is the first of a projected series entitled "The Schools of Philosophy: A History of the Evolution of Philosophical Thought, by Various Writers," under the editorship of Sir Henry Jones. The only preface is a general one to the whole series. From it we learn that its aim is to present "a history of the movement of philosophical thought," written originally in our own language, and fit to take the place for English readers held by the histories of Hegel and Erdmann in Germany. This scarcely prepares the reader for the statement that "This book does not profess to be a history of educational theory, and makes no pretence of giving a chronological account of all the happenings that mark the process by which our present stage of educational theory has been reached. It is enough if it indicates the great lines of progress, and brings them into relation with each other" (pp. 102-103). The book, in accordance with this conception, consists of a series of studies of various aspects of educational theory, the development of each being traced in relation to the most characteristic writers, and ends with a review of the present state of things entitled "The Educational Outlook."

From the point of view of the exposition of theory—and this, we take it, is Professor Adams' real concern—this method has its advantages, and in a *Review* such as this it is needless to say that the discussions are able and stimulating. But from the standpoint of the history of philosophy it seems to be open to serious objection. We cannot put the first requisite of a historical treatment better than in Professor Adams' own words: "Each age demands a new statement of educational theory. . . . It wants all the matters that affect it to be brought into direct relation with its particular form of civilization, and not with some other, however superior that other may be intrinsically" (p. 97), and it is just this affiliation that the topical method fails to establish. Moreover, we have ever found the common labels of humanism, realism, naturalism, idealism, materialism, and the like, more misleading than helpful. They do not indicate a true classification, for they are based on different principles, referring now to what should be taught, now to how far the child should be controlled, now to a metaphysical conception of the relation of mental life to its environment, now to the purpose of life and of education as a factor in life. Doubtless, all these elements have been emphasized by this writer and by that, and, more important, doubtless each has, at one time or another, been dominant in the way in which thoughtful people in general regarded the bringing up of children. But they do not—and never can—stand on the same level; they do not simply support or oppose each other in educational theory.

Professor Adams sets forth his general conception of what that theory is in the first chapter. In discussing its relation to practice he seems to us to exaggerate the possible independence of theory, when he follows Hamilton in the view that "in theoretical philosophy it occupies the whole field, and has nothing to do with practice" (p. 3). We much prefer the statement on page 7 that "in the ultimate resort there cannot be anything but a purely artificial distinction between practice and theory," and agree that "to be wisely theoretical we must be intelligently practical" (p. 2). For, just as theory is implicit in practice, so practice—at least as a possibility—is implicit in theory as distinct from fancy. But this is mainly a matter of expression. Not so, however, with the limitation of education which seems to us to run throughout the book. It is education in the popular sense of schooling of which Professor Adams treats, and although he warns us several times that education is wider than teaching, yet "the plain man takes it for granted that knowledge is the essential educational organon, and that school is the place where this organon can be most effectively applied" (p. 11), and we gather that our author agrees with him. For the teacher is the professional educator to whom parents commit the formal education of their young (p. 109), but who should recognize some right of the parent to participate "under reasonable conditions" in the knowledge the schoolmaster has obtained of his child (p. 361). And while the discussions of what should be taught are copious and keen, there is no similar discussion of the duties and functions of parents as educators or of the nature of all that is summed up under influence and moral discipline.

We much regret that Professor Adams should thus seem to lend the weight of his authority to what we believe to be one of the most mischievous errors of popular thought and speech. In these days of increasing neglect by parents of their highest duty towards their children, we do not think it well to approve, even by implication, the belief that they can delegate that duty to the schoolmaster. No doubt, thus to limit the scope of the enquiry facilitates exposition and gives a greater appearance of completeness to the theory expounded, but nothing is more misleading than a simplification obtained by ignoring some of the essential factors of the problem. It is not, we believe, good for education to make its theory as neglectful of actualities as, say, the Ricardian Political Economy. We are sure Professor Adams would agree; but we feel, too, that the danger of such misconception is not absent from any treatment which regards education as a professional work, in the same sense as, say, law or medicine. After all, the school never did educate or train a child; it can only play its part in that training, and that part, we are convinced, is not even the most important one. Nor is the teacher, who takes up schoolmastering as a profession, an educator in as vital a sense as is the parent, on whom the task is imposed by nature. Each may perform it well or ill, and probably parental failure is more common than scholastic futility, for parents are very numerous and often not very wise. But educators they must be—good or bad—and it is of the greatest importance that this should be emphasized by all who write with knowledge of the subject. If, after this, the discussion is confined to one branch of the subject, the fact that it is thus partial, and to that extent abstract, should be constantly kept to the front.

After setting forth his view of the nature and scope of the theory of education, Professor Adams discusses its data, the essential elements of which are the original bodily and mental endowment of the child, his environment, and the time, especially that spent in school. Then follows a chapter presenting the view of the historical aspect with which in general we have already dealt. One or two points deserve further notice. It is true, as the writer says, that in books on the history of education there is often a break between Quintilian and the Renaissance. That, however, may be explained as easily on the hypothesis that the writers of those books share in the very general ignorance of mediæval life, which is only just beginning to be dissipated, as on that of the absence of any theory of education during those centuries. Even if treatises on the subject were not written, yet, as Professor Adams grants on page 133, theory may exist without being in documentary form. And nothing seems more certain than that the mediæval scholars to whom Europe owes the universities, and who covered Christendom with schools, had clear conceptions of the purpose and the duties of life, and of the nature and method of knowledge. Professor Adams' own discussion of mediæval education is limited to that given in monasteries, and we are not convinced of his reading of the meaning of monastic life. This leads us to notice what seems to us a most serious omission. There is no treatment of the Catholic ideal of education. Not only historically but practically that ideal is surely of sufficient importance to merit consideration, and it carries with it a theory which cannot be adequately brought under any of Professor Adams' rubrics.

We next have a chapter on the prehistoric stage, in which the most remarkable passage seems to us to be on page 106, where we are told that "First innate ideas, then innate faculties have gone, and the way seems prepared for the exeunt of innate instincts." If so, nothing seems left but the empty Herbartian soul, which we do not gather to be any more acceptable to Professor Adams than to ourselves. In the fifth chapter—on the social and individual aim in education—we have a brief sketch of Greek theories, of Roman education, and of monasticism. Then comes an able chapter on Specific Education, followed by one on The Educational Organon, i.e., knowledge. Professor Adams heads this chapter with a quotation from Mr. Holman which explicitly limits education to development "purposely determined by the systematic imparting of knowledge" (p. 186). We presume that Professor Adams does not accept this, for if he did "the distinction between education and instruction" which he tells us he has aimed at keeping prominent throughout (p. 400) would disappear, unless, indeed, a narrow and pedantic meaning be given to "instruction." But in this and the succeeding chapters it is the question of curriculum that is persistently to the front. These chapters deal with Humanism, as instruction mainly through language, and its relation to Realism, as instruction primarily through "things." Then follows a chapter on Naturalism, with a consideration of Rousseau and Goethe; another on The Idealistic Basis of Education, with a brief consideration of Pestalozzi and Frœbel, and a discussion of the extent to which education is a positive formative influence. The eleventh chapter deals with "The Mechanical View," with discussions of La Mettrie, D' Holbach and Herbart. Here Professor Adams argues that the reconciliation of the two ends of self-realization and many-sided interest, which he gave in the first chapter as the aims of education, is secured. The book ends with a discussion of The Educational Outlook, in which the conclusion is reached that "the trend of educational theory is certainly in the direction of giving a bias towards the future life-work of the educand" (p. 369), and an optimistic view is expressed of the services experiment may be expected to render to education in the future.

We have preferred to give a description of this important book to singling out topics for laudation or criticism, just because the topics are so many and are so ably treated. Suffice it to say that within the limits he has laid down for himself, which are sufficiently indicated above, Professor Adams has turned out a notable piece of work. Much that he says is to us quite convincing, and even when conviction does not follow reading and thought, we feel that the position is strongly maintained, and is one for which much not only can be said but has been said. The arguments are concisely and clearly put, though, of course, the book demands—and deserves—strenuous thinking. All of us who are interested in the subject can only feel grateful to Professor Adams for what he has given us, and promise to give it what it calls for—our earnest and frequent meditation.

J. WELTON.

"**The Teacher's Encyclopædia.**" Edited by A. P. Laurie, M.A., D.Sc. Vol. VII (pp. ix + 251). Caxton Publishing Company. 8/6 net.

WITH the exception of brief articles on "The Training of Teachers in Scotland" (7 pp.) by Dr. Morgan; "The Training of Teachers" (19 pp.) by Mr. Raymont; and "The Teacher's Library" (5 pp.) by Professor Adams, this last volume of *The Teacher's Encyclopædia* consists of "A History of Educational Thought," occupying 204 pages, of which the last 145 pages are by Professor Darroch, of Edinburgh, and the first 59 pages—dealing with Greek and Roman education—by his Assistant, Mr. James Drever. To this article we propose to confine our remarks.

One turns to each new work on educational history in the ever-renewed hope of finding supplied the want, so severely felt by every teacher of the subject, of a satisfactory text-book. Ever, unhappily, one meets with disappointment, and we regret to express our judgment that this essay is no exception to the rule. What has been attempted has been in many ways well done. But what we regard as essential has, at any rate for the period since the Renaissance, not been attempted.

By "educational thought" may obviously be meant one of two things, which not only are not coincident, but are often antagonistic. The reference may be to the prevailing ideas which determine the actual educative efforts of any given age; or it may be to the theories advanced by writers largely in revolt against those current conceptions. Doubtless these latter are part of the total thought about education of their time, and they must be included in a history of educational thought. But they were seldom the dominant or effective part, and to limit the treatment to them is not only to imply what is historically false as to the general attitude of successive ages, but to give a distorted vision of the theories themselves by separating them from the concrete setting in relation to which alone their true significance is to be found.

The introductory chapter raised the hope that this fundamental fault would be avoided, and to a large extent it has been in the earlier periods. But when we get to the centuries after the Renaissance we have a series of short essays on most of the writers commonly treated, with the addition of Fichte and Hegel but with no mention of the Port-Royalists, concluding with a brief treatment of pragmatism. Throughout, a sound and convenient mode of presentation is adopted. The general ideas of the writer under consideration are set forth in numbered order, followed by a critical estimate, generally with a reference to the thought and needs of our own day. This is all admirably clear and methodical, and will be very acceptable to students. That there is a general note of incompleteness may be put down to the limitation of space which has put any adequate treatment out of the question. Each section ends with a brief list of "References" which we find rather incomprehensible. There are very few to books of first-rate value, and still fewer to original sources; the majority are to books which really do not matter. Very brief and inadequate sections on the general characteristics of the Renaissance and on Modern Times are all that is attempted in the way of showing that "educational change is an integral part of the wider phenomenon of social change" (p. 1).

Mr. Drever seems to have kept in view more clearly than Professor Darroch the necessity of relating the theories of thinkers and writers to the current ideas of life, and his treatment of Greek education—especially of that at Sparta—is as satisfactory as his space would allow. We do not think he is equally successful with Roman education, and it seems to us a confusion of thought to treat Quintilian before the Græco-Roman rhetorical training, of which he was the most competent exponent. We miss also any reference here to that tract on education commonly attributed to Plutarch, which was so unblushingly "conveyed" into their own treatises by the humanist scholars of the Renaissance.

In Professor Darroch's portion of the "History," undoubtedly the weakest part is the treatment of mediæval education and thought. The passage on Scholasticism (pp. 74-76), indeed, can hardly be excused even by the inexorable demand for brevity which has spoiled the whole article. The writer gives no evidence of having studied a single scholastic work; Aquinas is not even mentioned, and the list of references contains not a single writer who treats scholasticism from within. Even if the references are intended for beginners, Fr. Rickaby's excellent little primer on the subject might have been included. Nor is there any indication that the writer is aware that scholasticism is still very much alive. Moreover, the evidence advanced by such writers as Mr. A. F. Leach has had no effect on Professor Darroch's mind, for we cannot suppose that he is unacquainted with it. He still asserts that at the end of the mediæval period "the great majority of the people were sunk in the densest ignorance." We wonder whether he has ever considered the meaning of the number and kinds of books issued from the early printing presses. The Protestant bias colours, quite unconsciously, the writer's judgments, sometimes in an amusing way. Luther, for example, "struck the true note when he said and laid down that the ancient languages were worthy of study because of the light that they threw upon the correct study of Scripture" (p. 119), but the Jesuits are by implication blamed because "they subordinated the study of the classical languages and literature to the theological and religious aim" (p. 122). Altogether the treatment of the Jesuits seems to be based very little on their own testimony, and indeed to accept the uninformed misrepresentations of writers like Compayrê as trustworthy. Incidentally, what is the authority for writing Ignatius *von* Loyola?

In the modern period the order of treatment is at times difficult to understand. Rabelais and Montaigne follow Comenius; Kant, Fichte and Hegel come after Pestalozzi and Frœbel, though we are told explicitly that "Frœbel owes much to the philosophy and to the educational writings of Fichte" (p. 183).

Loose general statements are too numerous. For example: "the Spartans educated for war, the Athenians for peace" (p. 14); Francis Bacon "set forth a new method of investigation—the inductive" (p. 129); before Rousseau wrote education "had taken no account of the instincts or interests of the child" (p. 166). Yet on pages 93, 96, 139, 141, 146, we find statements wholly inconsistent with this last erroneous common-place. Similar inconsistencies are found elsewhere; for example, in what is said in different places about physical training in the Middle Ages. Throughout, the authors adopt the exasperating plan of quotation without reference.

That the article in review contains able summaries of selected writings, and will, in consequence, be found useful by students preparing for a certain type of examination can hardly be doubted; that it gives an adequate outline of the history of educational thought cannot, unhappily, be granted. The ability shown in what has been done, however, makes us regret that a more adequate treatment was not attempted.

J. WELTON.

"Introduction to Experimental Education." By Robert R. Rusk, M.A., Ph.D. (viii + 303 pp.) Longmans, Green & Co. 4/6 net.

IN an introductory chapter, which, in respect of its clearness and moderation, is typical of the whole book, Dr. Rusk reminds us that the claim that Education should be founded on experiment is by no means new. Yet "experimental Education" in the sense which the term now bears is so modern a thing that the present author has achieved the distinction of writing the first English text-book upon it. The book is professedly based upon Meumann's well-known *Vorlesungen* and in the main follows his division of the subject and his order of treatment. It is, however, the pleasant duty of the reviewer to warn readers that Dr. Rusk has modestly under-estimated the originality of his work. He has necessarily covered the same field as Meumann, but his survey has genuine independent value. Incidentally it brings out the importance of the contributions of American and British writers to the newer pedagogics. (Unfortunately, "American" must be written before "British"—complete justice would write it a long way before—but a glance down the index shows that we are not doing so badly. To encourage recruits to the service by demonstrating this fact may be not the least valuable result of the publication of Dr. Rusk's book).

The problems of "experimental Education" are just the problems which have faced the teacher during the whole history of civilization. The *differentia* of its method of attack is that it approaches them through what old Roger Bacon declared to be "the gateway of *all* other sciences—mathematics. The author begins his exposition, therefore, with a sketch of the methods which are now employed to give quantitative precision to the results of psychological experiments and observations. This sketch might with much advantage have been amplified. Mathematical instruction has as yet done little to cultivate the statistical sense among educated people; yet an elementary knowledge of modern methods of assessing the significance of a group of varying measurements is essential to a just appreciation of almost all quantitative work in this subject. It is possible that Thorndike's *Mental and Social Measurements* was purposely omitted from the references "for further reading" on statistical methods. Udney Yule's recent authoritative and excellent work should certainly be added to the list whenever an opportunity for revising it occurs.

In subsequent chapters the author sets forth the results of experimental inquiry in the various departments which have already attracted investigators. Detailed criticism of these chapters can hardly be made. It must suffice to say that although most of the really successful or promising researches are described, there are yet omissions to which it is a little difficult to be reconciled. Thus there is no account of investigations in the important subject of drawing. Again, while it is true that little is known about children's "reasoning," experiments such as those of Bonser have made a beginning which was worth mentioning. Moore's experiments on abstraction, though not made on children, have a relevance to the development of perception which would have justified their inclusion in the programme. The same thing is still more true of the experiments of Bryan and Harter and of Book on learning the telegraphic language and typewriting—experiments which have fundamental importance in connexion with the problem of teaching to write and read. The chapter on Mental Hygiene would have been improved by explicit references to McDougall's work on fatigue, though it is critical rather than experimental. W. Brown's pioneer work in analyzing mathematical activity into its elementary constituents has a significance for future research which should have secured it a place. Lastly, absence of any mention of Spearman's name in connexion with the problem of "general ability" is still more regrettable.

But though we may dissent here and there from Dr. Rusk's judgment of the relative values of some contributions to the subject, it must be admitted that he shows complete mastery of his materials, selects them, on the whole, fairly and with discrimination, and presents them with admirable lucidity and conciseness. No one will, in fact, dispute that his book gives a clear and trustworthy picture of the present state of pedagogical investigation, nor that it is written in such a way as to stimulate readers to further inquiry along the special lines opened up.

In a concluding chapter the author is careful to point out that "experimental Education" is as yet only at the beginning of its work, and indicates some of the directions in which very little progress, if any, has hitherto been made. It is, undoubtedly, of the first importance that the friends of the new movement should not magnify its actual achievements. The scoffer would find it an easy task to collect from Dr. Rusk's own candid pages a refutation of any exaggerated claims. Discrepancies and even contradictions between the results of different workers are numerous in almost every branch of the inquiries. It is only rarely that a perfectly definite practical conclusion can be drawn—as apparently it may be from Winch's study of fatigue among students in evening schools. Experiments in reading, writing and arithmetic, though they have definitely settled some essential points, have not closed the controversies between teachers of these elements. The results of many laborious researches on memory give a few useful "tips," but offer little help in the solution of the major problems of teaching. The too facile conclusions of earlier investigators with regard to "visuals" and "audiles" cannot now be confidently held, though better researches, such as Dr. Rusk's own, promise to throw really useful light on the functions of imagery in learning. With regard to the greatest part of the field an apologist must for the present be content to urge that the lack of accord between practical experimenters simply shows how unsuspectedly complicated are the problems which they have set themselves to solve, and that their slow movement towards unanimity implies an unravelling of the tangle of mental processes which no other means than quantitative investigation could have effected at all. The great service which the newer pedagogy has performed for Education is, indeed, not to solve teaching problems, but gradually to make their exact nature evident, and to give precise values to their data.

Dr. Rusk is to be congratulated upon a book well fitted to introduce a wide circle of readers to researches which, however their present results be estimated, are undoubtedly destined to affect profoundly the organization and practice of Education, and should, for this reason, be an object of interest to every member of the profession of teaching. T. P. Nunn.

"**An Introduction to Psychology, more especially for Teachers.**" By T. Loveday and J. A. Green. Oxford : at the Clarendon Press, 1912. (272 pp.) 3/6 net.

It is not often that authors have collaborated in writing works on Psychology, although the science is more urgent perhaps than any other in its demand for specialist training in more than one of the general directions of human thought. The combination of philosopher and educationist, both well known in their respective spheres, is especially felicitous in the present instance, since it is a guarantee that the book, elementary introduction though it may be, is at once philosophically sound and fitted for the use of teachers as a practical, no less than a theoretical, aid in their profession. The main characteristic of the book cannot be better summed up than in the opening sentences of the preface, which I take the liberty to quote: "We have not aimed at adding another to the long list of text-books of psychology, but only at providing a simple introduction to the subject for the use, more especially, of students of education in our training colleges. In the attempt to secure brevity and simplicity, we have often been dogmatic against our inclination ; we have evaded philosophical problems that are rightly attendant upon a consideration of the fundamental notions of psychology ; and we have omitted altogether certain topics, such as the physiology of the central nervous system, the detailed doctrine of sensations, and the theory of spatial perception, to which considerable space is allotted in most textbooks." One can only add that the dogmatism is of the slightest, and such as could hardly offend the most rigid stickler for philosophical precision and scientific exactitude. The omissions only leave greater space for the discussion of more important topics. The chief of these is Purpose, and the full discussion of this subject, to which two out of the sixteen chapters of the volume are devoted, is in keeping with the view, held by the majority of psychologists at the present day, that purposiveness is the one characteristic of mental process which most unambiguously marks it off from the subject-matter of the physical sciences. Feeling is also treated in some detail, and the difficult problem of the Self and its development is discussed in a vivid and interesting, if in a rather summary, way. The main psychological conceptions of Perception, Imaging, Memory, &c., form titles for other chapters, and are defined clearly, with a wealth of examples. Psychology is a difficult subject, and many books on the science make it appear even more difficult than it really is. Mr. Loveday and Professor Green have given us an introductory manual that creates rather the opposite impression. They have taken trouble to make the fundamental notions so clear and simple for the beginner that we are almost tempted to wish that they had gone further and added a larger body of ascertained fact such as would prevent any possible misunderstanding in the mind of the learner as to scope and difficulty of the science. As it is, however, we can only look forward to a later edition of the book in which such a supplementation may be made. In its present form, however, it is probably one of the clearest introductions to the science hitherto published. Some useful questions on the work of the various chapters are added in an Appendix. W. BROWN.

"**Psychology: The Study of Behaviour.**" By William MacDougall, M.B., Reader in Mental Philosophy in the University of Oxford. Home University Library, London, 1912, 8vo, pp 254. 1/- net.

THIS seems to me by far the best short sketch that I have seen of the position and aims of modern psychology. I am inclined to think that the description of psychology as the science of behaviour is too wide, unless the meaning of the word "behaviour" be rather artificially contracted, but I have no doubt that it expresses what on the whole is the best and most fertile way of stating the psychological problems, and that Dr. MacDougall's preference for the functional method over the static or "cinematographic" is entirely justified. After discussing this and allied questions in Chapters I and II, he proceeds to an account of "the structure of the mind," in which it is interesting to note that he is willing to allow due value to the notion of faculties, which has for some time past fallen into exaggerated discredit. The general description of mind in terms of dispositions and faculties is most lucidly set forth, and the author then proceeds to a chapter on the methods and departments of psychology, when he is careful to emphasize the fact that, theoretically, experiment and the comparative method, though they may require special skill and special knowledge, are not to be accounted special departments of the subject. Then follow chapters on the study of animal behaviour; the study of childhood, and individual psychology; abnormal psychology, and social psychology. All of them are excellent succinct accounts, and the only criticism I feel inclined to make is that under the heading of abnormal psychology so much space has been devoted to hysteria and to dreams, and the like, that all discussion of "mental diseases proper" is crowded out. T. LOVEDAY.

"**Vives and the Renascence Education of Women.**" By Professor Foster Watson. (Educational Classics—Edward Arnold) 4/6 net.

Vives and the Renascence Education of Women is a volume contributed by Professor Foster Watson to the very useful series of Educational Classics now being issued by Mr. Edward Arnold. It contains eight sections if we include, as indeed we must, the appendix. Juan Luis Vives was the author of five of these, which we have here in English renderings. *The Instruction of a Christian Woman* is given in the translation of Richard Hyrde, first published in 1528; *The Learning of Women* (from the de Officio Mariti) is in Thomas Paynell's version (1550); *The Plan of Girls' Studies*, *The Plan of Boys' Studies*, and the examples of the *Satellitium* we owe in their English form to Dr. Watson. In addition, the volume includes Hyrde's *Preface* (1524, on *The Education of Women*) to Margaret Roper's translation of Erasmus' *Precatio dominica in septem portiones distributa*; a piece, entitled "The School of Sir Thomas More," taken from Cresacre More's "Life of Sir Thomas More; and Sir Thomas Elyot's *Defence of Good Women*. All these documents of first-rate importance are here gathered together in convenient form, and their significance is brought out in a learned and luminous introduction.

It is remarkable, as the Editor insists, that all the writings presented in this volume fall within fifteen years—1523 to 1538; before them, in the fifteen centuries of the Christian era, it would appear that we have but four treatises on women's Education. Dr. Watson traces in brief, but clear, pages the influence of Catherine of Aragon upon the development of education generally, and, in particular, upon the education of girls and women, and he shows not less well the influence of Vives upon the Queen. To her Vives dedicated the *de Institutione Christianæ feminæ*; to her daughter, Mary, he dedicated the *Satellitium*. A quite fascinating part of the introduction is that in which the manifold relationships are explained of the persons whose names come to us with these pieces, as patrons, friends, authors, translators, teachers, pupils, all bound together by ties, if not of blood, then of spiritual and intellectual kinship. A notice such as this can only be an announcement that such a book exists. We have long needed it, and our thanks, already due and paid to Dr. Watson for many gifts, are due once more, and are thus, heartily though imperfectly, rendered. This is the handiwork of scholars, restored by a craftsman whose skill and sympathy match his erudition. E. T. CAMPAGNAC.

"Rousseau on Education." Edited by R. L. Archer, M.A. (278 + xii pp.) Edward Arnold. *(Educational Classics.)* 1912. 4/6 net.

OF modern writers on education few have been more misunderstood than Rousseau. A man of paradox, of abnormal sensibility, to whom the source of all social wrong had suddenly disclosed itself in an overwhelming revelation, his value lies in the fact that among many extravagances and inconsistencies, he proclaimed a great truth and made men realize the urgency of a great reform. To his passionate plea for the universal recognition of the sanctity of individual personality, for the abolition of tyranny in all its subtle forms, whether in the family, the school, or society, has been due his influence on cultivated laymen and thoughtful teachers for a century and a half. The stressing of individual worth, the attempts to harmonize the claims of the individual and society, the shifting emphasis from the adult and the curriculum to the child and child-life, were to Rousseau inevitable corollaries of that return to Nature which later generations have oftentimes contrived so signally to misunderstand. To elaborate the truisms which we owe to him, and to make good conspicuous defects in his presentation of the educational and social problem, has been the task of later workers in the same field, but Rousseau still remains perhaps the greatest and most inspiring writer on education of modern times.

In the series of Educational Classics, edited by Professor Adamson, it was fitting that an attempt should be made to gather together, in convenient form and under one cover, all that is typical of Rousseau's educational teaching. To do this there are, broadly speaking, two alternatives: either to select the typical parts of his writings, translate them and fill in the gaps by concise summaries, or frankly to depart from the text and merely aim at giving the substance and purport of his writing in as modern a form as possible. Mr. Archer adopts the former of the two methods. About three-fourths of the book is made up of extracts from the *Emile*, while the rest is given up to extracts from the *Nouvelle Héloïse*, the treatise on the Government of Poland, the letter to the Duke of Würtemberg, &c. Nothing of importance is omitted with the possible exception of part of the article Political Economy in the *Encyclopédie*, and the translation, as far as it goes, is a very scholarly one and the best we have. But here and there it is open to criticism, either because of over-excision or through lack of adequate connecting summaries. To take a typical example, the paragraph, pp. 155-6, loses its point through brevity, for the summaries at the beginning and end are quite inadequate. On pp. 196-7 the translator seems to fall between two stools, and such examples could easily be multiplied. Moreover, the constant excisions in the middle of paragraphs are likely to hinder beginners from getting a real grip of Rousseau's message, as practical experience with the book has demonstrated, for the students who read French frequently turn up the original. These, however, are minor defects, and do not in any way detract from the value of the book as a real acquisition to our educational literature. Its value is increased by the subdivision of the text under appropriate headings, by the addition of a valuable subject index, and by a useful 18 pp. introduction in which are discussed in outline the origin of Rousseau's views on education, and the nature and extent of his influence. We cannot, however, always accept Mr. Archer's interpretation either of Rousseau's educational position, or his influence, for his stock sayings to be taken too literally. Thus it is difficult to accept without modification such statements as "Rousseau stands for extreme individualism against the claims of society," "His attitude is that education must be wholly civil or wholly individualistic." And in any case it is Rousseau's liberalism and his abhorrence of tyranny in all its forms that is his merit—a liberalism writ large in spite of enormous limitations in his views on the education of girls.

Among the list of other translations of the *Emile*, that by Miss Foxley (Everyman) has been overlooked. C. BIRCHENOUGH.

"**The Educational Writings of John Locke.**" Edited by John William Adamson, Professor of Education in the University of London. London, 1912, 8vo., pp. viii, + 272. Price 4/6 net.

THIS volume of the "Educational Classics" Series contains Locke's "Some Thoughts Concerning Education," and his Tract "Of the Conduct of the Understanding," with an Introduction and Notes by the General Editor of the Series. It is hardly necessary to say that the editing has been capitally well done. The notes are commendably few, brief, and pointed. The introduction says all that is necessary to make clear Locke's general attitude towards subjects of intellectual enquiry, without professing to go far into the details of his philosophy. I am not sure that it might not have been as well to say so much about Locke's life as would emphasize his practical experience and capacity. Both these educational treatises belong to the latter part of his life, and the dislike of verbiage, which they, like the "Essay" express, and their tendency to rather narrow utilitarianism in education, are certainly due in part to his medical experience and to his familiarity with, and real interest and ability in, public affairs. Professor Adamson has applied himself, however, to what no doubt will be to most of his readers the more interesting problem of making clear Locke's "position amongst the various influences which have shaped the real history of education," and has succeeded in sketching in very few pages, but with a master's skill, the character of the usual education of the children of the well-to-do in the seventeenth century, the grounds of Locke's reasonable dissatisfaction with it, and the chief merits and defects of his proposals for its improvement.

Nothing can be more significant than Locke's decided preference for education at home to education in a school. Himself schooled at Westminster, and later himself the tutor of a famous pupil, he knew both systems by personal experience. He is quite well aware of what has always been advanced as the chief merit of the public school, that it makes a boy "bolder, and better able to bustle and shift amongst boys of his own age," and this is a merit that one would expect to commend itself strongly to the high sense of the value of practical efficiency. But, he concludes, assurance will come later, and soon enough, from conversation with men; in the meantime "it is preposterous to sacrifice a boy's innocency to the attaining of confidence." If Locke's assumption was justified, that to send a boy to school was to throw him into the company of "ill-bred and vicious" fellows, it does little credit to the schools of the time; but, bad though schools may have been, one feels throughout that Locke's metaphor of the *tabula rasa* leads him to underestimate original differences of temperament and disposition, to over-estimate the effect of environment, and therefore (like Plato) to desiderate a prolongation of the age of innocence, which is in practice extremely dangerous. Generally speaking, however, in these observations on the training of young gentlemen, as in all of Locke's writings, one is amazed at the penetration of his insight—where he sees at all.

One small detail occurs to me. On p. 17 the Editor remarks that the only two English authors whom Locke singles out as suitable for study are Cudworth and Chillingworth. It might have been worth mentioning that Cudworth's name would naturally occur to Locke when living in the same house as Lady Masham.

T. LOVEDAY.

"**The Psychology of Insanity.**" By Bernard Hart, M.D. (Lond.). Cambridge University Press, 1912. Price 1s. net.

THIS little work is one of the latest batch of the Cambridge Manuals of Science and Literature. Its contents give no reason to suppose that the author wrote with anyone except the "general reader" in view; nevertheless the book may be commended to teachers as especially worthy of their attention.

Students of psychology and education have long recognized that the study of pathological cases ought to throw useful light upon the mechanism of the normal mind. In these cases Nature does what the human experimenter can rarely do: by producing large quantitative variations in the several factors of a psychophysical process she gives opportunities for estimating the significance of each.

Unfortunately, however, those whose business it is to be conversant with Nature's experimenting have differed so much in their interpretations of the data that the value for pedagogy of their labours has hitherto proved less than might have been expected. It is possible (though Dr. Hart does not say so) that this comparative failure is due to the natural tendency of the medical investigator to seek explanations of mental abnormalities in disturbances of the structure and functions of the brain. In any case, our author is one of a modern school who have deliberately adopted a radically different method. Following Freud of Vienna and Jung of Zürich, these psychiatrists seek to understand and control the phenomena of insanity by means of purely psychological observations and hypotheses. They may be said, paradoxically but truly, to aim at demonstrating the rationality of insane psychoses; that is, they seek to account for every mental "abnormality" by reference to psychological laws which work in precisely the same way in the sane.

It is claimed by this school that the assimilation of "abnormal" to "normal" psychology has greatly increased the psychiatrist's power to minister to minds diseased. It has certainly made his work much more helpful to the student of education. If the mind of the average adult is the standard of normality the teacher's concern, also, is with "abnormal psychology." He cannot fail, therefore, to gain much illumination from an analysis of pathological phenomena which shows them to be often little more than an exaggerated reproduction of the peculiarities of childhood.

Dr. Hart has presented the essentials of such an analysis lucidly, simply and with plenty of effective illustrations. While in the main following Freud in his theory of "complexes," he modifies the Viennese master's teaching in one important detail. Most English readers of Freud find themselves reluctant to accept his doctrine of the dominating importance of the sexual element in mental life—even though he uses the term "sexual element" in an unusually wide sense. They will be relieved to discover that Dr. Hart, like Mr. McDougall, holds that this doctrine needs considerable correction. In his own theory of insanity he attaches chief significance to "conflict" between complexes derived from the "herd instinct" and those based upon the other fundamental dispositions. On this subject he says enough to indicate that it is a very important as well as an interesting conception, and one which is likely to prove of much value in interpreting the facts of the normal development of personality. T. P. NUNN.

"High School Education." By Dr. C. H. Johnston and others. (xxii + 555 pp.). New York: Scribner, 1912. $1.50.

AMERICAN educational organization presents many fascinating problems to English educationists, problems which, *mutatis mutandis*, will emerge before long on this side. Its elementary schools are strikingly uniform in all the great centres. Their curriculum is based upon the view that, with small exception, up to the age of fourteen, a certain stereotyped form of education is suitable for all children. But American Universities are more adaptable than ours, and American High Schools are differentiating into Manual Training High Schools, Schools of Commerce, and other direct preparations for life, as distinguished from preparations for college. Their Public High Schools are at once democratic and selective. Everybody can go, if they are fit. Many get there who are not fit, but that is opposed to the ideal of the system. These conditions in which the High School educators of the States have to work are especially interesting, because they are likely to be our own conditions some day, and the work of Dr. Johnston and his collaborators will be found indicative for us.

Chapters are to be found on the Programme of Studies; The Disciplinary Basis of Courses of Study; Organization of Secondary Education; and, of course, on the usual school topics, Latin, Natural Sciences, &c. Other chapters, more interesting, perhaps, to us, because presenting more novelty, are on Public Speaking (a widely-spread capacity in the States); Sex Pedagogy; Practical Arts for Girls, and Psychology in the High School Curriculum.

All the writers, explicitly or implicitly, answer the questions: What do we teach this subject for? How shall we teach it? How far can or ought it to be correlated with other subjects? And occasionally the question is raised, Who are those who ought to learn it and how are they selected? This last question has been far too much neglected in America as in England, for democracy too readily assumes that everybody can and ought to learn everything. The results of such a view are disheartenment to both pupil and teacher, and great national waste—American "High School mortality" being one aspect of it.

It is, of course, quite impossible, in a brief notice of this kind, to do more than indicate what the reader may expect to find in the book. There is an enormous amount of guess-work—inevitable in the present state of educational science. But I freely admit that American writers on education certainly do possess, which most English writers do not, some knowledge of what psychologists in the laboratory and in the school are endeavouring to determine in a definite way. To talk about the psychological value of subjects of instruction is to talk largely in the air till this work has been done.

Two further comments. American educators are beginning to think that the pupil commences his secondary education too late; he should start at twelve, not at fourteen. And the writer of the chapter on Psychology thinks it can and should be taught in the High School, but *not*—and here I very heartily agree—as a sort of appendage to a description of the nervous system or by a memorization of text-books, but rather by an analysis of the processes of the pupils' own learning and thinking. But how many teachers even in America can do that, and in England how many?

W. H. WINCH.

"Outlines of the History of Education." By William B. Aspinwall, Pd.M., Ph.D., Professor of the History and Principles of Education, New York State Normal College. (xvi + 195 pp.) The Macmillan Company. 3/6 net.

THIS little book consists of skeleton outlines of the chief topics in the history of education from 4400 B.C. to the present day, with references for reading. They are the kind of notes one could with profit give one's students in connexion with one's course of lectures, and this is probably their origin. Of course, for another than the author to use them thus would seriously limit the freedom of his own exposition. Nevertheless, they would be useful in the hands of intelligent students as convenient summaries of important matter, though all would not agree that it is always the most important. Unhappily the value of the book is sadly impaired by the lists of readings. These mainly refer to small current histories of education instead of to works of serious scholarship or literary excellence.

J. W.

"A Report on Vocational Training in Chicago and in other Cities." By a Committee of the City Club of Chicago (xiii + 315 pp.). The City Club of Chicago. 1$ 50c.

THIS exhaustive report is of course primarily concerned with the great city from which it comes, but it has an interest for all who are concerned in the education of the children of our large towns. The report was prepared by a Committee of business men, with some expert aid, and with the financial assistance of a wealthy lady of their city. The Committee have given us a picture of vocational training, public and private, as it actually exists in New York, Boston, St. Louis, Chicago, and many other great centres of industry; they have estimated the industrial value of the curriculum of the existing elementary schools, and made many interesting recommendations for the future development of the vocational factor in public education.

It is hardly possible to do justice to this report in the space available, but some of its findings and recommendations are interesting enough to separate from their context. The investigation showed that, assuming the work of the recognized eight "grades" in the primary schools was the reasonable minimum for American citizenship, yet 43 per cent. of the children in these schools never reached the eighth grade. In Chicago one-third of the children at school are "retarded" children, that is to say, they are not in the grade demanded by their age. In the fifth grade, 47 per cent. are over age. The report shows that Chicago is not alone in this regard. Even in Germany, "with greater rigor of administration, longer school sessions, and a more restricted curriculum," the problem is not solved.

The enquiry showed that the tendency in Chicago was for children to leave school as soon as possible after the fourteenth birthday, and that the reason for this was not the financial necessity of the parents, but the child's own lack of interest in the school. Neither parents nor children see the "good" of further school time. The children are dominated by their interest in the society which they expect to enter, and a school which does not appeal directly to the vocational motive is bound to lose interest for them. The Committee urge the definite introduction of this motive in the seventh grade. Half the time should, they think, be then devoted to vocational work, and the school day should be six hours instead of five. "The work to be done is not of a manual training character," but "consists in actual trade processes," producing articles of commercial value.

For retarded children of twelve they would provide special vocational schools on the lines of a school which has been successfully run in Cleveland, Ohio.

Especially important is the finding in relation to the part children between 14 and 16 play in Chicago industry. The enquiry showed that the boys who leave school at 14 to go to work, are idle half their time during these two years, and that they earn on an average not more than two dollars a week. These boys, it is said, are not needed in the industries of the city, and the return they bring to their parents is negligible! Further, the children gain nothing that is of value to them later on, nay, they actually degenerate during those idle, irresponsible, and changeful years. All this brings them to the conclusion that compulsory school attendance should be prolonged to the sixteenth year so soon as provision for suitable vocational training can be made.

The conclusions of this Committee may not be startling in their novelty, but they are backed by a mass of interesting evidence relating to the inefficiency of the present school system of their city, which gives them great force. Moreover, they are the conclusions of men primarily interested in business. They are not "educational faddists."

J. A. GREEN.

"**The Elements of Child Protection.**" By Dr. Sigmund Engel, translated from the German by Dr. Eden Paul. G. Allen & Co. (xi + 276 pp.) 15/- net.

IN our last number we noticed a book from the same publishers (*The Sexual Life of the Child*), which Dr. Paul had translated, making thereby a valuable addition to the books available for the scientific understanding of childhood. Dr. Engel's survey of the principles and practice of Child Protection was equally worth translation, and our thanks are due to Dr. Paul for undertaking the labour. The author is a Hungarian lawyer whose point of view is that of the advanced Socialist. His exposition is marred by occasional and unnecessary attacks upon capitalism, which he holds responsible for most of the evils which afflict modern society. As the limitations of the book prevent any reasoned demonstration of that position, it might, we think, have been more gently stated, unless he wished to limit his readers to avowed followers of Karl Marx. Many people who are not Socialists will be "put off" by his assumptions in this direction.

An out-and-out Eugenist, and a defender of the artificial limitation of families, Dr. Engel is modern enough to appeal to the most advanced. Nevertheless, if old-fashioned folk are not frightened away by these doctrines, they will find much of interest and of value in the discussion of the problems of Child Protection. If all the problems are not solved, they are, at any rate, clearly stated, and the book might well be added to the libraries of all those who are directly concerned with the welfare of children, whether as administrators or as teachers. The book would, however, have been still more valuable had it contained references to the authorities upon which the author's conclusions are based.

J. A. G.

"**Character Training.**" By E. L. Cabot and E. Eyles. (384 pp.) Harrap & Co. 3/6 net.

MR. EYLES, who is head master of an elementary school in Willesden, has adapted Mrs. Cabot's well-known book for English use. For those who pin their faith to moral education of the type advocated by the Moral Education League, the book offers a suggestive scheme, and, indeed, all teachers will find it a mine of good stories which they may use independently of the "apparatus" of ethical instruction into which it is here meant to fit. Frankly we think that ethical situations are best dealt with as they arise, and not as the time table dictates. The life of the school, the opportunities of service and co-operation which it should offer, doing and not talking, seem to us the psychological determinants of a healthy moral life, aided as these will be by increasing knowledge of human relations which the History, the Literature and the Geography lessons, for example, will provide. Is not the synthetic presentation of morality in the guise of separate virtues in danger of producing at best a patchwork morality?

J. A. G.

"**The Gateways of Knowledge.**" By J. A. Dell, M.Sc. (xii + 171 pp.) Cambridge University Press. 2/6.

THIS is the second volume of the Cambridge Nature Study series which is appearing under the general guidance of Mr. Hugh Richardson. It is welcome for various reasons. The extension of the term Nature Study to include the experimental study of the sensorial activities of the student's own body is noteworthy, and Mr. Dell has succeeded in producing a very attractive book. Whether he will persuade schoolmasters to admit such a course as he has designed into their classrooms may be doubted, but as a course for schoolmasters themselves it seems admirably suited. As an auxiliary to the psychology of the Training College lecture room, there is, we think, a distinct place for the book. It goes without saying that the little volume is well produced, and the text is as clearly written as it is admirably printed and illustrated.

J. A. G.

"**History of English Literature.**" By Andrew Lang. (xxi + 689.) Longmans, Green & Co. 6s.

WHEN the ideal History of English Literature comes to be written it will have many of the qualities which appear scattered through this last book of Andrew Lang's. It will have felicitous and pointed phrasing, penetrative critical insight, sustained vivacity in biographical detail, learning lightly borne, refreshing independence and humanity in judgment. It will equally certainly have fewer references to Homer, for he will hardly be called in to sponsor Vaughan's *Timber;* there will be less sparing mention of Joan of Arc and Mary Queen of Scots; its account of Tickell is unlikely to include a Jacobite episode of some length, and Vathek will probably not remind the ideal author of "the Australian tribe the Euahlayi." But the ideal author will be well advised to appropriate almost entirely the accounts of Malory and Scott, and to give in full the first paragraph on Burns. Then he will have to make mention at least of Blake, for Andrew Lang, inadvertently one hopes, omitted him; also he will have to expound at greater length than Lang, and with clearer reference to Boileau, what Pope meant by Nature; and at still greater length again, the vastly different connotation of the term in Wordsworth's vocabulary and creed. In fact, one may say that the essayist and belle-lettrist, however universal his knowledge, may easily leave half his task undone; probably none but a mind at least a little given to pedantry—Lang's was not—should essay it. Individual judgment, especially by him, is a delight, but it admits the possibility of inadequate appreciation in some cases. No admirer of Meredith will be content with the reluctant acknowledgment of prose and verse here: nor will those who have studied the constructive skill of *The Ring and the Book* think the three or four lines on it sufficient which close with the statement "the Pope sums up all in a poem by a fourth part longer than the Iliad." One of the almost insuperable difficulties in a work of this kind is that of division and arrangement. The method of this book is to treat author after author in separate compartments. In the main the chapter divisions are illuminating; but it is not easy to detect the principle by which Spenser comes under the heading of "Prose of the Renaissance"; and the multitudinous moderns of the Old and New Worlds are rather huddled together. The treatment of Shakespeare may seem a little perfunctory and disappointing; the sonnets are taken at too great length compared with the major tragedies, and the brief disjointed comment on separate plays leaves no space for comprehensive survey of Shakespeare's dramatic achievement.

Some views of an earlier generation of criticism are still retained. *Gammer Gurton's Needle* is no longer credited to Bishop Still; it is not quite true on a closer examination that the blank verse of *Gorboduc* "has no merit except that of regularity"; and recent scholars have discovered in the fact that the songs only appear in Lyly's plays twenty-six years after his death, a reason for attributing them to another writer, and Dekker is suggested. Words like Boldenrele (for Boldensele, p. 119) and Sir Ephraim Mammon (for Sir Epicure, p. 236) seem to indicate a hurried reading of proofs.

But when all qualifications are admitted there remains a book of nearly 700 pages on a well-worn theme, which is inspired by an infectious enthusiasm, flavoured with the wit born of full knowledge and quick apprehension of absurdities and pedantries, a mine of good phrases (examiners will get to know them), and almost the only history of English Literature which can be read for pleasnre in an arm-chair.

W. T. YOUNG.

"An Introduction to Mathematics." By A. N. Whitehead, Sc.D., F.R.S. Home University Library, Williams & Norgate. 1s. net.

LIKE all popular, i.e., cheap, introductions to mathematics this book is esoteric. Heaven help the working-man who acquires it for a teetotal "bob"! But the trained mathematician will read with pure delight this consciously witty discussion of first principles written by the Master seated in his easy chair. The chapters on Functions and Series especially will fascinate. Those who can and do teach will find much that they can apply to illuminate and vivify their class work, e.g., the work on zero, and much of the history.

Here and there the author mistakes generality for lucidity. His treatment of the Argand diagram is unnecessarily cumbrous and artificial, and the beginning of Chapter VIII is in direct contradiction to his own words (Universal Algebra, Vol. I, pp. 25, 26), and to the well-known laws of vectorial and quaternionic multiplication.

The course of mathematics propounded on the last two pages is ludicrously inadequate. Are Dr. Whitehead's early gropings forward so far away that he has forgotten them, or come to regard them as *neiges d'antan?*

F. J. O. CODDINGTON.

"Matter, Form and Style." By Hardress O'Grady. (viii + 125 pp.) Murray. 1/6.

THIS little book is an altogether admirable production. Written, we imagine, primarily for students and upper form boys who are ready to have their eyes opened to the essentials of good writing, it is at once interesting, stimulating and clear. The method is concrete and practical, and the appeal is thoroughly human. Teachers will find it extraordinarily suggestive, and pupils will get a good deal of pleasure out of it. We are grateful to Mr. O'Grady for what is, we think, a first-rate piece of work.

J. A. G.

"A Short History of Todmorden." By J. Holden. (viv + 242 pp.) The University Press, Manchester. 2/- net.

MR. HOLDEN'S book is, of course, primarily addressed to Todmorden people, but its interest is really very much wider. He has shown us how a local story may be made to illustrate the larger movements which have stirred the whole country, and thus we see the kind of service which local history may legitimately render in school. The book is well and clearly written, and we commend it very warmly to all teachers of history who are concerned with the problem of how to make the best use of local material.

J. A. G.

"Hygiene for Teachers." By R. A. Rowlands, B.Sc. (x + 356 pp.) Edward Arnold.

THIS is a text-book largely devoted to Physiology, many subjects being treated in a very detailed manner; for example, the composition of the Bile is given in full, a paragraph is devoted to a description of Taurocholate and Glycocholate of Sodium, another to the Bile Pigments: on the other hand, little more than one page is devoted to the Feeding of School Children, and no diet sheets are given.

The detailed description of the method of using a Hœmocytometer is, again, hardly necessary for students in Training Colleges and the teachers for whom the book is written.

The book will be of value to lecturers in Training Colleges who are not medical men, but to the ordinary student the deficiencies in the part devoted to practical school work, such as open-air schools, &c., will counterbalance the information obtainable in the physiological section. R. P. WILLIAMS.

"Modern Geography." Marion J. Newbigin, D.Sc. (256 pp.) Norgate & Williams, (Home University Library. 1912. 1/- net.

FOR a decade or so the man in the street has been increasingly aware of a change in the sort of geography that is being taught in schools. Boys don't know their facts as glibly as he knew them, but what has been substituted is not always very apparent. Many teachers, even, find themselves hard put to to say what marks the essential difference between the old and the new geography. The truth is that modern geography is a geography of increasingly-big principles that seek to co-ordinate and vitalize the multitudinous facts that went to make up the geography of fifty years ago. Herein lies its elusiveness to the non-specialist teacher not less than to the layman, and here, too, must be sought the source of the ineffectiveness of much geography teaching in schools to-day.

Any book, then, that can help to clear away difficulties by setting out the standpoint of the modern geographer is welcome, the more so if it deals with the problem in a simple and popular manner. Miss Newbigin's book satisfies these requirements in a marked degree. For purposes of simplicity she has confined herself to the geography of Europe and North America, and has produced a valuable and instructive book that should appeal to a wide audience. There is nothing of the dry-as-dust geography in it. The whole book is alive, and the underlying principles are presented in simple and telling fashion. The list of standard works given in the Appendix, and the suggestions for reading, add still further to its value. It is a book that ought to be in the hands of Training College students and of all teachers of the subject who, at present, often feel themselves more or less groping in the dark. C. BIRCHENOUGH.

MESSRS. LONGMAN & GREEN have published a delightful set of twelve coloured pictures for schoolroom use. These animal studies are bound to meet with the children's approval for two reasons: they are bright in colour, running through soft and delicate into rich tones; and most of the animals are about their business of the day, in the fields, the water, or on the heath, or rocks.

Each animal stands well for his type. The otter is still the fierce beast that scared Tom, the Water Baby, as he guards the silvery fish he has caught; the hedgehog, prickly and inquisitive, investigates an upturned beetle; the wild cat, standing in the snow, with russet bracken behind, is on the alert for danger; the mole in his glossy velvet coat is blind to the beautiful autumn bramble leaves and yellow fungi growing about the brown sandy patch upon which he straggles; the dainty wood, field, and dor mice; the grey seals, plashing in the water and lying clumsily on the red seaweed and rocky bases; and the golden brown fox, with her three frisky cubs, are only a few studies in the thoroughly-pleasing set of pictures.

The size of each picture is about 13 × 17 inches. The cost of each is 2/6.

WOUTRINA A. BONE.

"The Growth of Music." By H. C. Colles. Clarendon Press. (159 pp.) 4s. net.

THIS book is Part I of a study in musical history for schools, dealing with the period extending from the Troubadours to Bach. Its style suggests that it is the record of lectures actually given to a class which had already mastered the most elementary principles of harmony. As a model of sympathetic insight and lucid exposition it is a book which no teacher of music should neglect. The treatment of the subject is suggestive rather than exhaustive ; the influences which moulded each master are brought out, and the continuity in the evolution of musical theory made manifest. We are made to see how those masters, whose originality is unchallenged, are still building upon the work of their predecessors, and are influenced by that of their contemporaries ; thus we learn of Bach's indebtedness to Couperin, and of Handel's to the elder Scarlatti.

Our author successfully avoids a very common pitfall into which historians of music fall—his work is really a history of music, and is not crowded with irrelevant biographical detail.

The value of the book is heightened by the musical illustrations given in the text, and the reference to further illustrative material made at the end of each chapter. The account of the musical instruments available at each period is clear and adequate.

V. W. PEARSON.

"Intermediate Physics." By W. Watson, A.R.C.S., D.Sc., F.R.S. (xiii + 564 pp.) Longmans. 6s.

PROF. WATSON is well known as the author of one of the most popular text-books on Physics for Final B.Sc. use. At the first turning over of the pages, his new volume on " Intermediate " Physics might well be mistaken for another Final one. There are chapters or paragraphs on Interference, Diffraction, Stefan's and Wien's Law, Polarisation and Double Refraction, Single, two- and three-phase Alternating Currents, Electromagnetic Waves, Ionisation of Gases, and Radio-activity, including an up-to-date complete table of the transformations of radioactive substances. Such a list from an Intermediate textbook illustrates the direction of the change which is tending to come over the teaching of elementary Physics as the result of the striking developments of the science during the last decade. It must be admitted that many of these subjects, hitherto untouched in Intermediate courses, are later of great practical importance to Medical and Engineering students who do not usually continue their study of Physics. Prof. Watson explains in his preface that the inclusion of them has been rendered possible only by the omission or brief treatment of some of the simpler phenomena which it is usuul to include in textbooks. When nothing essential to the fundamental principles is omitted, as is here the case, it is evident that to include so great a range of subjects in the compass of a book of 550 pages, a good deal of condensation in the presentation of the elementary matter is necessary. Some teachers may be inclined to question the extent to which this can be done without detriment to the soundness of the knowledge instilled. Apart from this debatable point, the name of the author renders it hardly necessary to say that the book is well written, and eminently suitable to its purpose.

S.R.M.

"British Historical Fiction." By J. A. Buckley and W. T. Williams. (vi + 182 pp.) Harrap. 2/6 net.

STARTING with the Eolithic Age, and ending with the British share in putting down the Boxer Rebellion, this book offers a fiction list which illustrates the whole range of our History. From the eighth century downwards, every century, and almost every decade, is represented. A short paragraph is given to each book, setting out its historical subject-matter, and roughly appraising its value from the historical point of view. The work has been most carefully done, and teachers are sure to find it useful.

J. A. G.

"Religion, Morals and Manners." By J. E. Feasey. (232 pp.) Frowde. 3/6 net.

MR. FEASEY has produced a very suggestive book for all who are interested in the question of how to use the Bible in school. He writes easily, and his work shows not only a thorough acquaintance with the Bible stories themselves, but an aptness in secular illustration and amplification which is bound to be helpful to his readers. His general plan is to take some specific virtue, or some typical relation in current life, and after putting his pupils at the point of view, to show them what light the Bible throws upon it. As examples of his chapter headings, we may cite "Perseverance," "Justice," "Debtor and Creditor," "A Tragedy of Vanity and Ambition," There are obvious limitations to such treatment of the sacred text, but there is much to be said for it when children of elementary school age are concerned. Dr. Sadler has written a short and sympathetic preface to these interesting studies in method. J. A. G.

BOOKS RECEIVED.

(Notice in this column does not preclude more detailed review in a later issue)

"Archives Sociologiques." Bulletins No. 18-22. Publiées par Emile Waxwaler.

[These five numbers of the *Archives* contain over 1,500 pages. They seek to present a chronicle of the scientific movement so far as this relates directly to mankind. Thus Biology, Psychology, History, Archæology, Ethnology, Religion, Language, Political Economy, Military Science, Criminology, Law, Political Science, Literature and Art, Ethics, Education, Sociology and Social Philosophy, Statistics, &c., are embraced in its programme. It is a product of the activities of the Solvay Institute in Brussels, which was established in 1902 in the Leopold Park by Mr. Ernest Solvay as a centre of sociological research. The subscription price is 20 francs for countries other than Belgium.]

"An Introductory Economic History of England." By S. Salmon. (vii + 130 pp.) Longmans. 1/6.

[Though the book was written primarily for Sixth Form boys, it might well be read by Training College students who are giving special attention to History. The exposition of such special topics as the Industrial Revolution, Pauperism and the Poor Law, Free Trade, &c., is very simple and clear, though necessarily brief. A Bibliography adds greatly to the value of the book.]

"The Psychology of Conduct." By H. H. Schroeder. (287 pp.) Row, Peterson & Co., Chicago.

[The book is written with special reference to the problem of Education, not for specialists that is to say, but for teachers.]

"Atlanta's Race and the Proud King." By William Morris. xix + 60 pp.) Longman's Class Books of English Literature. 1/-.

[The Introduction tells the story of Morris's life-work; special attention is given to his chief literary work, "The Earthly Paradise." Would it not be possible to publish such a book at half the price? For extensive school use cheapness is absolutely essential.]

"L'Année Pédagogique," par L. Cellérier et L. Dugas. (viii + 486 pp.) Alcan, Paris. 7 francs.

[This is the first volume of a new venture which deserves the warm support of English readers. Its peculiar usefulness consists in the exhaustive bibliography of the educational literature of 1911. The bibliography is classified and also well indexed. All books and articles of importance are briefly summarized. The first ninety pages are devoted to a series of articles on educational problems from a modern standpoint. The editors are to be warmly congratulated on the first volume of what we hope will be a permanent annual addition to our educational resources.]

"**Pestalozzi's Educational Writings.**" Edited by J. A. Green, M.A., and F. Collie, M.A. (viii. + 328 pp.) E. Arnold. 4/6.

"**Froebel's Chief Educational Writings.**" Rendered into English by S. S. F. Fletcher, Ph.D., and J. Welton, M.A. (vi. + 246 pp.). E. Arnold. 4/6 net.

"**Fundamentals of Psychology.**" By B. Dumville, M.A. (viii. + 380 pp.). Clive & Co. 4/6.

[A short account of the subject, written especially for the use of teachers.]

"**Exercises in English.**" By J. Mushett. (vii + 196 pp.) Baxendine. 2/-.

"**Mrs. Browning and her Poetry;**" by K. E. Royds. "**Scott and his Poetry;**" by A. E. Morgan. 10d. each, limp cloth.

[Further volumes in Messrs. Harrap's School Series "Poetry and Life."]

"**Shakespeare's 'King John.'**" Edited by C. W. Crook, B.A., B.Sc. (157 pp.). Ralph, Holland & Co. 2/-.

"**Grundzüge der Natur Lehre.** Von J. G. Wallentin. Edited by P. M. Palmer (iv. + 218 pp.). Heath & Co. 3/6.

[The first six chapters of a well-known German book, edited as an introduction to scientific German.]

"**Elementary Chemical Theory.**" By J. M. Wadmore. (xi + 275 pp.) Methuen & Co.

"**Experimental Domestic Science.**" By R. H. Jones. (ix + 235 pp.) Heinemann. 2/6.

Business Geography. J. Hamilton Birrell, M.A. (208 pp.) Ralph Holland & Co. 1912. Cr. 8vo. 1/6 net.

"**Clay Modelling.**" By H. A. Rankin (224 pp.). The Woman Teacher Press. 3/6 net.

CORRESPONDENCE.

DISCIPLES AND APOSTLES.

To the Editor of the "Journal of Experimental Pedagogy."

Sir,

It is ungracious to comment on a review which is so kindly appreciative, and distasteful to discuss oneself; but I feel constrained to send you a line to disclaim the biographical account which you have inserted in your notice of my little volume in The Home University Library.

As I look back on the development of pedagogy during the last thirty years, and examine my own reaction to it, I am sure, if any man can be sure of his own convictions, that I have "refused to carry banners." Yet you conceive me to be nowadays a "a fervent apostle" of Dewey, while earlier I "represented Herbart!" If you are sceptical, I can privately furnish you with evidence to show how definitely I have worked to oppose such fervour. But it will concern your readers more to consider why one *should* so vehemently oppose the promoters of sects and parties. Firstly, because you lose the chance of further revelation when you join a party. Note at the present moment what a flutter of the dovecotes has been caused by the advent of the Montessorists! The Frœbellians are undecided whether to assert that the new Italian prescription is bad because it contradicts Frœbel, or good because it is not seriously different from Frœbel. And you, Sir (if I may offer an impertinent *tuquoque*), as a devout Pestalozzian must discover that the Dottoressa owes all her ideas to Pestalozzi! Surely the time has come for us to drop these personal sentimental attitudes—even the theologians are setting us an example nowadays. Arnold, Dewey, Meumann, Locke—does it matter a penny-piece which of them has helped us to understand our business, if they do help us?

But still more important, not only does our adoption of a hero and his party hinder our learning from others: it prevents us from *relying upon ourselves*. Again, if I wished to follow you in discussing "the Findlay of 1898," I could show that you are mistaken in points of fact. But that is of no importance with the rest of your readers; I am unconcerned to turn up that record. The lamentable thing is that so few teachers (I mean serious professional students) seem to feel the obligation of personal, strenuous investigation leading to the rare joy of discovery on their own account. Here we are, living in an epoch when other callings and professions are passionately bent on discovery; the world of thought and action is being made over anew in every field, but we English teachers are too modest (or intellectually lazy?) to believe that we can take our share. The best we can do (if we accept our judgment of each other) is to label ourselves after the achievements of some foreign researcher, and call ourselves Deweyites or Montessorists or Meumanners! It perhaps is a presumptuous statement to make, but I really believe that I have been thinking for myself for twenty years past. If this does not appear so to my readers, I am not concerned; I have myself the pleasure—which transcends all other satisfactions open to a professional man—of finding at rare intervals some new aspect, some new mode of work, new combination of ideas. Doubtless, it is all old; Plato, Mulcaster, or primitive man probably used it before, but

> If it be not old to me,
> What care I how old it be!

And finally, this depressing effect upon our own development reacts upon our public influence. Let me repeat, we live in a world which, even since the days of Herbart and Frœbel, has marvellously changed in its general state of mind. We who write and speak on matters educational are—to put it frankly—not in great esteem in the general world of culture and science. Our profession itself, as I have shown in the book you reviewed, confines and cribs our mental and spiritual outlook; so that the narrowness which comes from following a sect justifies and enhances that distrust of the teacher which is, on other grounds, the badge of all our tribe.

You will see, I trust, that I am writing with no sense of personal grievance, but am taking occasion of a trifling incident to hammer home a text on which, as my friends will know, I have privately preached for many a long year. I do not think I should have troubled you, however, if the invasion of "Montessori" had not provided so apt and entertaining an illustration for this little sermon. Instead of being content with discipleship, let us (of course with proper acknowledgment) imitate the example of famous bards such as Homer and Kipling:

> When 'Omer smote his bloomin' lyre,
> He'd 'eard men sing by land an' sea;
> An' what he thought 'e might require,
> 'E went an' took—the same as me!

With apologies,

Yours,

15th November, 1912.

J. J. FINDLAY.

TRAINING COLLEGE ASSOCIATION.

A deputation of Principals of Training Colleges interested in University work waited upon the President of the Board of Education on the 22nd of June last. Canon Wesley Dennis spoke on behalf of the Residential Colleges. Professor J. Adams and Professor J. A. Green made representations on behalf of the University Training Colleges. Amongst the subjects discussed were the disabilities of the students who, having failed in the University Examination, left their colleges without professional qualification, and the new Regulations for four-year students. The deputation was very sympathetically received by the President, who was accompanied by Mr. Trevelyan, Mr. Selby Bigge, and other officers of the Board.

MINUTES OF COMMITTEE MEETING HELD AT THE LONDON DAY TRAINING COLLEGE ON OCTOBER 11TH, 1912.

The following signed the Attendance Roll:—Prof. J. Adams (President), Miss S. Walker and Professor J. A. Green (Vice-Presidents), Mr. W. Loring (Ex-President). Mr. H. H. E. J. Curzon, Mr. I. B. John, Miss E. Christopher, Rev. Canon Dennis, Miss M. E. Bishop, Miss K. T. Stephenson, Mr. A. A. Cock, Mr. A. P. Braddock, Mr. E. H. Magson, Rev. S. Blofeld, Rev. R. Hudson, Rev. E. M. Radford, Mrs. Bannister, Miss L. M. Hardy, Miss E. M. Julian, Mr. H. S. Cooke, Rev. H. A. Bren, Rev. I. A. Smith, Mr. F. G. Perrins, Rev. D. J. Thomas, Mr. E. H. Strugnell, Prof. J. J. Findlay, Miss F. E. Johnson, Miss B. Forth, Miss E. M. Gowan, Miss M. McDonald, Miss L. A. Kay, Miss S. E. S. Richards, Miss M. Liberty, Miss H. Wodehonse, Miss A. Hague, Miss A. F. Dodd, Mr. J. W. Jarvis, Rev. V. W. Pearson, Mr. D. R. Harris, and the Hon. Sec.

Apologies for absence were received from:—Rev. J. A. Hannah, Mr. J. H. Gettins, Rev. Canon Stephenson, Mr. S. Hoole, Dr. Thomson, Rev. Dr. Workman, Miss J. Dunlop.

1. The Minutes of the March Committee Meeting, and of the Special Committee Meeting on May 31st, were read and confirmed.
2. The following nominations were received for 1913:—
   (*a*) Vice-Presidents:—Miss B. Forth, Miss A. Lloyd-Evans, Miss K. Stephenson, Miss C. Graveson, Rev. R. Hudson, Dr. Percy Nunn, Rev. Canon Stephenson, Rev. Dr. Workman.
   (*b*) Hon. Sec. and Treasurer: Mr. H. E. Griffiths.
3. A report was made by Mr. Loring and the Secretary, of the "Conference Week" arrangements as far as made.
   The date is January 6th—11th, 1913.
   Opening Address by Sir H. Miers, Principal of the University of London, on Monday afternoon, to be followed by Dr. Sadler, Vice-Chancellor of the University of Leeds, who will open a general discussion.
   The Training College Association has assigned to it Monday evening, Tuesday morning and afternoon.
   It was decided to hold the Monday evening meeting (Sectional) at 5.45 p.m.
4. The following Sub-Committee was appointed to make the arrangements for the Annual Meeting:—Miss Julian, Miss Bishop, Miss Lloyd-Evans, Mrs. Bannister, Mr. Burrell, Mr. Raymont, Rev. Canon Dennis, with the Officers.
5. Canon Dennis reported a meeting of the Representative Sub-Committee with the County Councils Association in July, on the question of the Supply of Teachers.
   It was decided the Representative Sub-Committee should deal with the question, that they should have power to confer with the County Councils Association and the Board of Education if necessary, and that they should report to the General Committee, or to a General Meeting of the Association.
6. A discussion took place on Circular 805, and it was decided that the Representative Sub-Committee consider the matter—really the same question as (5) above.
   It was decided also to ask the Board to postpone any further action until the Association has considered the whole question, and reported the result to the Board.
7. Letters were read from two members complaining of the Examination Paper on the Principles of Teaching set at the Final Examination, 1912.
   Some discussion followed, and it was eventually decided that, taking into account the fact that the syllabus and curriculum are at present being revised by the Board, it would be unwise to make representations at this stage. The resolutions proposed were therefore withdrawn for the present.

Special attention is drawn to the Conference week of Educational Associations which is to be held in the week beginning Monday, January 6th. A large number of Educational Associations have joined in this attempt to concentrate educational interests, and the University of London has generously placed its buildings at the disposal of the Conference. Mr. F. Fairman, Secretary of the Teachers' Guild, 74 Gower Street, is acting as Secretary to the Conference.

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EDUCATIONAL HANDWORK ASSOCIATION.

President—THE RIGHT HON. A. H. D. ACLAND.

Chairman of Executive - Professor J. A. GREEN, M.A., The University of Sheffield.

Hon. Sec. and Treas. - J. SPITTLE, F.E.I.S., 20 Water Street, Huddersfield.

THE Association stands for all that is best in modern practical education. Amongst the many privileges which its members enjoy may be mentioned the following:—

(1). **Free** admission to all Lectures and Discussions arranged by the Association or its Branches.

(2). **Free** delivery of the Journal of the Association (published monthly, price 2d.—post free 3d.). This publication keeps readers in touch with the latest developments in sound Educational methods. It should be read by **all** teachers. Its articles and papers are written by acknowledged experts.

(3). Participation in the Free Studentship awarded *pro rata* by the Association to members, tenable at the Summer Schools.

The Annual Subscription is only 2/6. You may join at any time, and will be entitled to all the benefits of membership for the ensuing 12 months.

Send a post card to the Hon. Secretary for a specimen copy of the Journal, list of Branches, &c.

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